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LLOYD'S REGISTER

OF

BRITISH AND FOREIGN SHIPPING.

PUBLICATIONS ISSUED BY THE COMMITTEE OF LLOYD'S REGISTER.

LLOYD'S REGISTER OF SHIPPING, issued annually on the 1st of July. This Book contains the Names, CLASSES, and detailed information concerning the Vessels classed by Lloyd's Register and the late Underwriters' Registry for Iron Vessels; and in addition, as far as possible, particulars of all SEA-GOING VESSELS in the world, and of all iron and steel vessels trading on the North American Lakes of 100 tons and upwards.

In the Appendix will be found a list of Owners of Ships recorded in the Register Book; details of the Dry and Wet Docks, Floating Docks, Pontoons, Patent Slipways, Tidal Harbours, Quays, &c., at all Ports in the World; a list of Telegraphic Addresses of all firms, &c., connected with Shipping (with the Telegraphic Codes severally employed), so far as ascertained; a list of Steamers arranged according to their gross tonnages; detailed Statistics respecting Merchant Shipping; lists of Shipbuilders, with names of existing Vessels built by each; list of fast Merchant Steamers, &c., &c.

A list is also printed in the Appendix of the Members and Subscribers of Lloyd's, and of the Agents to Lloyd's.

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THE RULES FOR THE BUILDING AND CLASSIFICATION OF SHIPS are also published separately.

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ESTABLISHED 1834.

(United with the Underwriters' Registry for Iron Vessels in 1885).

RULES & REGULATIONS

FOR THE

CONSTRUCTION AND CLASSIFICATION OF STEEL VESSELS.

From 1st July, 1897, to the 30th June, 1898.

OFFICE:—2, WHITE LION COURT, CORNHILL, LONDON.
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2. Norway.
3. Sweden.
4. Denmark
5. Germany.
6. Holland.
7. Belgium.
8. France.
9. Spain and Portugal.
10. Azores.
11. Gibraltar.
12. Canary Islands.
13. Italy and Austria.
14. Malta.
15. Greece, Turkey, Turkey in Asia, and Roumania.
16. British North America.
17. Newfoundland.
18. United States.
19. South America.
20. North Africa.
21. Egypt and Red Sea Ports.
22. South Africa.
23. Mauritius.
24. India, Burmah, and Straits Settlements.
25. West India Islands.
26. East Indian Archipelago.
27. China and Japan.
28. Australia, Tasmania, and New Zealand.

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ROTTERDAM *with Dordrecht, Schiedam, and surrounding places, also Zeeland. Ship and Engineer Surveyor* (*Address, Vaste Land, 16, Rotterdam;* TELEGRAMS, *Vanollefen, Vasteland, Rotterdam*) ... — *W. F. D. Van Ollefen

* Mr. Van Ollefen is exclusively an Officer of Lloyd's Register.

VEENDAM *with Groningen, Zwolle, Harlingen, Embden, and surrounding places, including Hanover* ... ... (*Address, Kerklaan, H. 785, Veendam;* TELEGRAMS, *Hazewinkel, Expert*) — H. P. Hazewinkel

FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

7. BELGIUM.

Antwerp	*including the various Belgian Ports and the Dutch Port Terneuzen* ... ... (*Surveyors' Office, 27, Rue d'Amsterdam, Antwerp*; Telegrams, *Paasch*)	Heinrich Paasch
	Engineer Surveyor ... ... (Telegrams, *Demblon*)	Francis Demblon

8. FRANCE.

Bordeaux...	(*Address, 16, Rue Esprit des Lois*; Telegrams, *Albert Vandercruyce*)	Albert Vandercruyce
	Engineer Surveyor ... (Telegrams, *Arthur Donzelle*)	Arthur Donzelle
Dunkirk	*including* Calais ... ... (*Office*, 7, *Rue des Arbres*; Telegrams, *Dewulf*)	H. Dewulf
Hâvre	*with a District including Boulogne and Barfleur* (*Address*, 28, *Place de l'Hôtel de Ville, Hâvre*; Telegrams, *Wilkinson*)	*Henri Wilkinson
	Assistant Ship and Engineer Surveyor	*A. Cartier

*Mr. Wilkinson and Mr. Cartier are exclusively Officers of Lloyd's Register.

La Rochelle	... ...	P. Tribot
Marseilles	*Ship and Engineer Surveyor* ... ... (*Address*, *26*, *Rue de la République*; Telegrams, *Vence*)	Jules Vence
Nantes	*Ship and Engineer Surveyor* ... (*Office*, *44*, *Boulevard St. Aignan*; Telegrams, *Deprise*, *Nantes*)	Joseph R. Deprise

9. SPAIN AND PORTUGAL.

Barcelona	*Ship and Engineer Surveyor* (*Office*, *15*, *Ronda Universidad*; Telegrams, *Roural*, *Barcelona*)	G. E. A. Muston
Bilbao	(*Address, Calle de la Sierra, 14*; Telegrams, *Lloyds*)	German De Bareno
Cadiz	*Ship and Engineer Surveyor*... ...(*Address Aduana, 8*; Telegrams, *West*	William West
Carthagena	*Ship and Engineer Surveyor* ... ... (Telegrams, *Perez, Palas 5, Carthagena*)	R. Perez y Ros
Lisbon	*Ship and Engineer Surveyor* ... ... (*Address, 8, Rua do Prata*; Telegrams, *Piston*)	Alexander Henderson
Malaga	*Ship and Engineer Surveyor* ... (Telegrams, *Lappe*)	Enrique Lappe
Oporto	*Ship and Engineer Surveyor* ... ... (*Office, 55, Rua da Rebobeira*; Telegrams, *Ennor*)	Charles J. Ennor

10. AZORES.

St. Michael's	(*Address, Rua dos Mercadores, No. 46, Ponta Delgada*; Telegrams, *Josouza, Ponta Delgada*)	J. J. de Souza

FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

11. GIBRALTAR.

GIBRALTAR	*Ship and Engineer Surveyor* ... ... (*Address, H.M. Naval Yard, Gibraltar;* TELEGRAMS, *Yard*)	J. H. Gilbert

12. CANARY ISLANDS.

LAS PALMAS	*Ship and Engineer Surveyor for Canary Islands*	

13. ITALY AND AUSTRIA.

ANCONA	... ... (TELEGRAMS, *Devon*)	F. G. Emett
GENOA	... ... (*Office, Piazza S. Giorgio No. 32, 1a Scala;* TELEGRAMS, *Schiaffino, Surveyor*)	Francesco Schiaffino
LEGHORN	... ... (TELEGRAMS, *A. Gori, Leghorn*)	Amerigo Gori
NAPLES	*with Messina and other ports in Sicily* ... ... *Ship and Engineer Surveyor* (*Residing at Torre Annunciata, near Naples*; TELEGRAMS, *Ducoster, Torrannunziata*)	Francesco Ducoster
TRIESTE	*with district of the Austro-Hungarian Coast* ... ... (*Office, Via delle Poste Vecchie, Trieste;* TELEGRAMS, *Elias Florio*)	Elias Florio
	Engineer Surveyor for Trieste District (TELEGRAMS, *Schnabl*)	Frederick Schnabl
	Assistant Ship Surveyor at Fiume for Wood Ships ...	Ignazio Bonetich
	Assistant Ship Surveyor for Iron and Steel Vessels, and Engineer Surveyor at Fiume (TELEGRAMS, *Schnabl, Fiume*)	Anthony Schnabl

14. MALTA.

MALTA	*Ship and Engineer Surveyor* ... (*Office, 21, Strada Zaccaria, Valetta;* TELEGRAMS, *Register*)	C. H. Wright

15. GREECE, TURKEY, TURKEY IN ASIA, AND ROUMANIA.

CONSTANTINOPLE	... ... (TELEGRAMS, *Woods*)	Admiral Woods Pasha
	Engineer Surveyor ... ...(TELEGRAMS, *Warren*)	G. R. Warren
GALATZ AND BRAILA	*with a district extending as far as the mouth of the Danube and including Sulina* ... (*residing at Braila;* TELEGRAMS, *Archbold*)	T. H. Archbold
PIRÆUS	*Ship and Engineer Surveyor*	James Stuart

16. BRITISH NORTH AMERICA.

HALIFAX, N.S.	... ... (TELEGRAMS, *Huntcom*)	David Hunter
MONTREAL	(*Address, Port Warden's Office;* TELEGRAMS, *Portwarden*)	Archibald Reid
PRINCE EDWARD ISLAND	... ... (*residing at Charlotte Town;* TELEGRAMS, *Register, Charlotte Town*)	H. P. Welsh
QUEBEC	*and the River St. Lawrence* (TELEGRAMS, *Brunelle, Quebec*)	P. D. Brunelle
VANCOUVER ISLAND	*Ship and Engineer Surveyor* ... ... (*Office, 57, Wharf Street, Victoria, B.C.;* TELEGRAMS, *Cartmel, Victoria, B.C.*)	Daniel Cartmel

FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

17. NEWFOUNDLAND.

NEWFOUNDLAND ...	... (*Address*, 12, *Gower Street, St. John's;* TELEGRAMS, *Surveyor*)	* George Wheatley

* Mr. Wheatley is exclusively an Officer of Lloyd's Register.

18. UNITED STATES.

NEW YORK	*Principal Surveyor for the United States, and Surveyor for the Port and District of New York*... (*Office, Kemble Buildings, Whitehall Street, New York;* TELEGRAMS, *Nymdible*)	* Thomas Congdon
	Ship and Engineer Surveyor	* J. H. Mancor

* Mr. Congdon and Mr. Mancor are exclusively Officers of Lloyd's Register.

BALTIMORE	*and the Ports in Chesapeake Bay* (*Office*, 11, *South Gay Street;* TELEGRAMS, *Hoyle*)	Edward H. Sanford
	Engineer Surveyor ... (*Address*, 530, *Light Street, Baltimore;* TELEGRAMS, *Higgins, Baltimore*)	H. C. Higgins
BOSTON	*Ship and Engineer Surveyor* (TELEGRAMS, *Olshaw*)	Oliver L. Shaw
NEW ORLEANS	(*Address, care of Messrs. Marshall J. Smith & Co.*, 64, *Baronne Street*; TELEGRAMS, *Turley*)	J. K. Turley
PHILADELPHIA	*Ship and Engineer Surveyor* ... ... (*Office*, 206, *Walnut Place, Philadelphia;* TELEGRAMS, *Haug*)	John Haug
PORTLAND, OREGON...	... ... (TELEGRAMS, *Pope*)	George Pope
SAN FRANCISCO ...	... ... (*Address*, 304, *California Street;* TELEGRAMS, *Freeboard, San Frisco*)	John Metcalfe

19. SOUTH AMERICA.

BUENOS AYRES AND ROSARIO	*Ship and Engineer Surveyor* (*Office*, 407, *Cangallo, Buenos Ayres;* TELEGRAMS, *Perito*)	*Thomas L. Gray

* Mr. Gray is exclusively an Officer of Lloyd's Register.

DEMERARA ...	(*residing at Georgetown*; TELEGRAMS, *Heliostat*)	Alexander Duncan
MONTE VIDEO	(*Address, care of Messrs. Carlisle, Smith & Co.*, 29, *Calle Rincon*; TELEGRAMS, *Crocker*)	F. Crocker
PARA	*Ship and Engineer Surveyor* (*Address*, 51, *Boulevard da Republica;* TELEGRAMS, *Greaves, Para*)	Thomas Greaves
RIO DE JANEIRO	*Ship and Engineer Surveyor* ... (*Office*, 64 *Rua* 1° *de Marco. Letters should be addressed to Caixa* 741; TELEGRAMS, *Register, Rio*)	*A. S. Williamson

*Mr. Williamson is exclusively an Officer of Lloyd's Register.

VALPARAISO	*Ship and Engineer Surveyor* ... ... (*Address, Casilla*, 934; TELEGRAMS, *Smith, Pacific, Valparaiso*)	A. F. Smith

20. NORTH AFRICA.

ALGIERS, ORAN, AND CONSTANTINE (*residing at Algiers*; TELEGRAMS,)

FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

21. EGYPT AND RED SEA PORTS.

Aden ...	*Ship and Engineer Surveyor* ... ... (*Address, Hudjuff, Aden;* Telegrams, *Still, Aden*)	W. H. Still
Suez	*Ship and Engineer Surveyor* ... (Telegrams, *Metal*)	John Campbell

22. SOUTH AFRICA.

Cape Town	... (*Address, Dock Office;* Telegrams, *Almutium*)	W. Stephen
Port Natal	... ... (Telegrams, *Airth*)	Alexander Airth

23. MAURITIUS.

Mauritius	... (*residing at Port Louis;* Telegrams, *McDonald, Mauritius*)	M. S. McDonald

24. INDIA, BURMAH, AND STRAITS SETTLEMENTS.

Akyab	... ... (Telegrams, *Lloyd's Surveyor*)	G. B. Brown
Bombay	... (*Address, Sirdar's Buildings, Hummum Street*) (Telegraphic Address for Mr. Clark, *Surveyors*)	A. C. Clark
	Engineer Surveyor ... (*Address, Calicut Street*) (Telegraphic Address for Mr. Moir, *Frigid*)	James Moir
Calcutta	*Ship and Engineer Surveyor* (*Office, 2, Hare Street;* Telegrams, *Surveyor*)	*T. W. Fish

* Mr. Fish is exclusively an Officer of Lloyd's Register.

Colombo	... ... (Telegrams, *Donnan*)	J. Donnan
Kurrachee	*Ship and Engineer Surveyor* (*Address, Persian Gulf Telegraphs, Manora, Kurrachee;* Telegrams, *Hughes*)	J. Hughes
Penang	... ... (Telegrams, *Bradbery*)	E. Bradbery
	Engineer Surveyor ... ... (Telegrams, *Dick*)	J. N. Dick
Rangoon	... ...(Telegrams, *Winter*)	R. R. Winter
Singapore	*Ship and Engineer Surveyor* (*Office, 7E, Battery Road;* Telegrams, *Kidd*)	*A. Kidd

*Mr. Kidd is exclusively an Officer of Lloyd's Register.

25. WEST INDIA ISLANDS.

Barbados	... ... (Telegrams, *Fox, Barbados*)	H. L. Fox

26. EAST INDIAN ARCHIPELAGO.

Batavia	... ... (Telegrams, *Taalingen, Batavia*)	H. van Taalingen
Cheribon, Java	... ... (Telegrams, *Campbell*)	C. Campbell
Manila	*and Ports in the Philippine Islands* ... ... *Ship and Engineer Surveyor* ... ... (Telegrams, *Dearnshaw, Manila*)	Daniel Earnshaw
Sourabaÿa	... ... (Telegrams, *Schipper, Sourabaya*)	B. J. Schipper

FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

27. CHINA AND JAPAN.

Hong Kong	*Ship and Engineer Surveyor* (*Office, 9, Praya Central;* (Telegrams, *Marine*)	*Newman Mumford

*Mr. Mumford is exclusively an Officer of Lloyd's Register.

Kobé, Hiogo	*Ship and Engineer Surveyor* (Telegrams, *Ellerton*)	James Ellerton
Nagasaki	*Ship and Engineer Surveyor* (Telegrams, *Robertson*)	David F. Robertson
Shanghai	*Ship and Engineer Surveyor* (Telegrams, *Sonne*)	H. Sonne
Yokohama	... ...(Telegrams, *Efford*)	John J. Efford
	Engineer Surveyor (*resident at Tokio;* Telegrams, *Macnab, Tokio*)	A. F. Macnab

28. AUSTRALIA, TASMANIA, AND NEW ZEALAND.

Adelaide, S.A.	... ...(*Office, Lipson Street, Port Adelaide*)	J. H. Gibbon
Auckland, N.Z.	... ... (Telegrams, *Replento*)	M. T. Clayton
Brisbane, Queensland	(*Address, Parbury's Buildings, Eagle Street;* Telegrams, *Surveyor, Brisbane*)	R. S. Taylor
Christchurch and Lyttelton, N.Z.	... ...(*residing at Lyttelton*)	Stewart Willis
Dunedin, N.Z.	... ... (Telegrams, *Gunwale*)	W. Thomson
Fremantle, W.A.	(*Address, P.O. Box 10;* Telegrams, *Webster*)	William Webster
Hobart, Tasmania...	... ... (Telegrams, *Macmillan, Hobart*)	Donald Macmillan
Melbourne, Victoria	(*Office, 9, Queen Street;* Telegrams, *Reports*)	William Watson
Napier, N.Z.	... ...	A. Davidson
Newcastle, N.S.W.	... ... (Telegrams, *Brooks*)	Thomas Brooks
	Engineer Surveyor	James Rorison
Sydney, N.S.W.	*Ship and Engineer Surveyor* (Telegrams, *Miramar*)	R. Pollock

2, White Lion Court, Cornhill, London.

June, 1897.

LIST OF SURVEYORS OF LLOYD'S REGISTER

(ALPHABETICALLY ARRANGED.)

THE SURVEYORS AT THE PORTS MARKED * ARE EXCLUSIVELY THE OFFICERS OF THE SOCIETY, AND ARE NOT PERMITTED TO ENGAGE IN ANY OTHER BUSINESS OR EMPLOYMENT WHATSOEVER.

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*LONDON (TELEGRAMS, *Committee*)	BENJAMIN MARTELL, ESQ., *Chief Surveyor of Lloyd's Register*	George P. Cooper, *Principal Surveyor for London District.*
		W. Moverly
	Harry J. Cornish, George Stanbury — *Assistants to Chief Surveyor*	Chas. H. Jordan
		C. Buchanan
		James H. Truscott
		E. C. Champness
		Geo. R. Mares
	JAMES T. MILTON, ESQ., *Chief Engineer Surveyor of Lloyd's Register*	E. J. Tierney
		A. Campbell-Holms
		S. A. G. Nash
		E. J. Milton
	J. E. Stoddart, *Assistant to Chief Engineer Surveyor*	J. Petree
		J. Bruhn
		S. O. Kendall
	Ship and Engineer Surveyors	D. Ritchie
		T. R. Blackie
		E. M. Salmon
		H. A. Ruck-Keene
		F. L. Sturgeon
	Draughtsman	David S. Hunter
	Examiner of Masts, Spars and Rigging	H. J. West
AALBORG (Copenhagen District)	*Assistant Ship Surveyor*	A. H. Jepmond
	Assistant Engineer Surveyor	L. S. Lange
*ABERDEEN	*Ship and Engineer Surveyor* (*Office*, *29*, *Regent Quay*)	Maurice Ritson
ADELAIDE, S. A.	(*Office*, *Lipson Street*, *Port Adelaide*)...	J. H. Gibbon
ADEN	*Ship and Engineer Surveyor* ... ... (*Address*, *Hudjuff*, *Aden*; TELEGRAMS, *Still*, *Aden*)	W. H. Still
AKYAB	... ... (TELEGRAMS, *Lloyd's Surveyor*)	G. B. Brown
ALGIERS, ORAN, AND CONSTANTINE	... ... (*residing at Algiers*)	
*AMSTERDAM	*Ship and Engineer Surveyor* ... ... (*Office*, *Prins Hendrikkade*, *No. 136*; TELEGRAMS, *Slebe*, *Prins Hendrikkade*, *Amsterdam*)	J. B. Slebe
ANCONA	... ... (TELEGRAMS, *Devon*)	F. G. Emett
ANTWERP	(*Surveyors' Office*, *27*, *Rue d'Amsterdam*, *Antwerp*; TELEGRAMS, *Paasch*)	Heinrich Paasch
	Engineer Surveyor ... (TELEGRAMS, *Demblon*)	Francis Demblon
AUCKLAND, N.Z.	... ... (TELEGRAMS, *Replento*)	M. T. Clayton
AZORES	(*Address*, *Rua dos Mercadores No. 46*, *Ponta Delgada*, *St. Michael's*; TELEGRAMS, *Josouza*, *Ponta Delgada*)	J. J. de Souza
BALTIMORE	*and the ports in Chesapeake Bay* (*Surveyor's Office*, *11*, *South Gay Street*; TELEGRAMS, *Hoyle*)	Edward H. Sanford
	Engineer Surveyor ... (*Address*, *530*, *Light Street*, *Baltimore*; TELEGRAMS, *Higgins*, *Baltimore*)	H. C. Higgins

LIST OF SURVEYORSHIPS (ALPHABETICALLY ARRANGED)—*continued.*

*BANGOR	... ... (*Address, 1, Glan Dwr Terrace*)	W. G. Copplestone
BARBADOS	... ...(TELEGRAMS, *Fox, Barbados*)	H. L. Fox
BARCELONA	*Ship and Engineer Surveyor* (*Office, 15, Ronda Universidad*; TELEGRAMS, *Roural, Barcelona*)	G. E. A. Muston
*BARROW	*Ship Surveyor*	W. Johnstone
	Ship and Engineer Surveyor (*Office, Ramsden Square*)	J. Easthope
*BARRY	*Ship and Engineer Surveyors* ... ... (*Office, Dock Chambers, Barry Dock*)	Wm. J. Darling H. E. Tilston
BATAVIA	... ... (TELEGRAMS, *Taalingen*)	H. van Taalingen
BATOUM	... ... (TELEGRAMS, *Mattievich, Batoum*)	F. A. Mattievich
*BELFAST	... ... (*Office, 53, Waring Street*)	James Turpin
	Ship and Engineer Surveyor	A. L. Jones
BERGEN	*Ship and Engineer Surveyor* (TELEGRAMS, *Hougland*)	E. Hougland
	Assistant Ship and Engineer Surveyor	Andreas Salvesen
*BIDEFORD	... ... (*Residing at Appledore*)	G. Westcott
BILBAO	(*Address, Calle de la Sierra 14*; TELEGRAMS, *Lloyd's*)	German De Bareno
BOMBAY	... (*Address, Sirdar's Buildings, Hummum Street*) (TELEGRAPHIC ADDRESS for Mr. Clark, *Surveyors*)	A. C. Clark
	Engineer Surveyor ... (*Address, Calicut Street*) (TELEGRAPHIC ADDRESS for Mr. Moir, *Frigid*)	James Moir
BORDEAUX	... ... (*Address, 16, Rue Esprit des Lois*; TELEGRAMS, *Albert Vandercruyce*)	Albert Vandercruyce
	Engineer Surveyor (TELEGRAMS, *Arthur Donzelle*)	Arthur Donzelle
BOSTON, MASS.	*Ship and Engineer Surveyor* (TELEGRAMS, *Olshaw*)	Oliver L. Shaw
BRAILA AND GALATZ	*with a district extending as far as the mouth of the Danube and including Sulina* ... ... (*residing at Braila*; TELEGRAMS, *Archbold*)	T. H. Archbold
BREMERHAVEN	*Ship and Engineer Surveyor for Weser District* ... (*Office, Burgermeister Smidstrasse, No. 110*; TELEGRAMS, *Ferd. Thomsen*)	F. H. T. Thomsen
BRISBANE, QUEENSLAND	(*Address, Parbury's Buildings, Eagle Street*; TELEGRAMS, *Surveyor, Brisbane*)	R. S. Taylor
*BRISTOL	*Ship and Engineer Surveyor* (*Office, 53, Queen's Square*)	C. Cooper
*BUENOS AYRES AND ROSARIO	... ... *Ship and Engineer Surveyor* (*Office, 407, Cangallo, Buenos Ayres*; TELEGRAMS, *Perito*)	Thomas L. Gray
CADIZ	*Ship and Engineer Surveyor* (*Address, Aduana, 8*; TELEGRAMS, *West*)	William West
*CALCUTTA	*Ship and Engineer Surveyor* (*Office, 2, Hare Street*; TELEGRAMS, *Surveyor*)	T. W. Fish
CAPE TOWN	(*Address, Dock Office*; TELEGRAMS, *Almutium*)	W. Stephen
*CARDIFF	... ... (*Offices, 128, Bute Street*)	Andrew K. Hamilton, *Principal Surveyor.* J. G. G. Rule D. Nicholas F. R. Noton
	Engineer Surveyor and Ship and Engineer Surveyors	J. F. Walliker W. Sibun J. Pollock

LIST OF SURVEYORSHIPS (ALPHABETICALLY ARRANGED)—*continued.*

CARTHAGENA	*Ship and Engineer Surveyor* ... ... (TELEGRAMS, *Perez, Palas 5*)	R. Perez y Ros
*CHANNEL ISLANDS	(*Office, 15, Mulcaster Street, St. Helier's, Jersey*)	J. F. Picot
CHERIBON, JAVA	... ... (TELEGRAMS, *Campbell*)	C. Campbell
CHRISTCHURCH AND LYTTELTON, N.Z.	... (*residing at Lyttelton*)	Stewart Willis
CHRISTIANIA	... ... (TELEGRAMS, *Fix*)	Christen Thorbjornsen
COLOMBO	... ... (TELEGRAMS, *Donnan*)	J. Donnan
CONSTANTINOPLE	... ... (TELEGRAMS, *Woods*)	Admiral Woods Pasha
	Engineer Surveyor ... (TELEGRAMS, *Warren*)	G. R. Warren
COPENHAGEN	*Ship and Engineer Surveyor* ... ... (*Office, 18, Fredericiagade, K.*; TELEGRAMS, *Krebsof*)	O. F. Krebs
	Assistant Ship and Engineer Surveyor	W. B. Herrmann
CRONSTADT AND ST. PETERSBURG	... *Ship and Engineer Surveyor* (*Address, W.O. 9th Line, No. 24, St. Petersburg*) (TELEGRAMS, *Wessblad, Petersburg*)	A. Wessblad
DANZIG	... ... (*Address, Johannisgasse 29/30*); TELEGRAMS, *Bartels, Johannisgasse 29/30, Danzig*)	F. A. Bartels
DEMERARA	... (*residing at Georgetown*; TELEGRAMS, *Heliostat*)	Alexander Duncan
*DUBLIN	... ... (*Address, 73, Clonliffe Road*)	W. F. Hooper
*DUNDEE	... (*Office, Maritime Buildings, East Dock Street*)	W. Morrison
DUNEDIN, N.Z.	... ... (TELEGRAMS, *Gunwale*)	W. Thomson
DUNKIRK	*Including* CALAIS ... (*Office, 7, Rue des Arbres*; TELEGRAMS, *Dewulf*)	H. Dewulf
*DUSSELDORF	*Ship and Engineer Surveyor for Steel Testing duties and Inspection of Forgings, &c., in Germany and Belgium* (*Address, Franklinstrasse No. 30, Dusseldorf*)	J. Meyer
*FALMOUTH	(*Surveyors' Office, Pendennis House, Lansdowne Road*)	T. H. Sandry
	Ship and Engineer Surveyor for Falmouth	R. H. Cooper
FIUME	*Assistant Ship Surveyor for Wood Ships*	Ignazio Bonetich
(Trieste District)	*Assistant Ship Surveyor for Iron and Steel Vessels, & Engineer Surveyor* (TELEGRAMS, *Schnabl, Fiume*)	Anthony Schnabl
FREMANTLE, W.A. ...	(*Address, P.O. Box 10*; TELEGRAMS, *Webster*)	William Webster
GALATZ and BRAILA	(*residing at Braila*: TELEGRAMS, *Archbold*)	T. H. Archbold
GENOA	... (*Office, Piazza S. Giorgio No. 32, 1a Scala*; TELEGRAMS, *Schiaffino, Surveyor*)	Francesco Schiaffino
GIBRALTAR	*Ship and Engineer Surveyor* (*Address, H.M. Naval Yard*; TELEGRAMS, *Yard*)	J. H. Gilbert
*GLASGOW	... . (*Office, 342, Argyle Street*)	Thomas J. Dodd, *Principal Surveyor.* S. J. P. Thearle Thomas S. Warren J. L. Sinnette Henry Hand W. H. Cooper J. Allan A. R. Sneddon R. Wright J. Craig G. O. Herbert J. McIlvenna

LIST OF SURVEYORSHIPS (ALPHABETICALLY ARRANGED)—*continued.*

*GLASGOW—*continued.*	*Principal Engineer Surveyor for Glasgow District* ...	James Mollison
	Engineer Surveyors and Ship and Engineer Surveyors	Charles E. Stromeyer W. R. Austin R. J. Beveridge J. G. Hunter A. McKeand W. C. Hamilton G. Murdoch B. G. Oxford A. C. Heron J. Kerr
	Inspectors of Forgings for the Clyde District	W. Hamilton F. Cook
GOTHENBURG	*Ship and Engineer Surveyor* ... ... (*Address, Lazareltsgatan No. 6;* TELEGRAMS, *Ingeniör Möller*)	Carl Axel Möller
*GREENOCK AND PORT GLASGOW	(*Offices, Commercial Bank Buildings, 14, Cross-shore Street, Greenock*)	Thomas Phillips, *Principal Surveyor.* T. J. House
	Ship and Engineer Surveyors	Andrew C. Heron R. Elliott
HALIFAX, N.S.	(TELEGRAMS, *Huntcom*)	David Hunter
*HAMBURG	(*Office, Steinhöft, No. 3;* TELEGRAMS, *Dykes, Steinhöft*)	Geo. Dykes
	Engineer Surveyor (*Office, Admiralitatstrasse, 52;* TELEGRAMS, *Berendt, Admiralitatstrasse, 52*)	†M. Berendt
	Assistant Engineer Surveyor	†C. H. Rieck

† Mr. Berendt and Mr. Rieck are not exclusively the servants of the Society.

*HARTLEPOOL, AND WEST HARTLEPOOL,	*with Whitby and Scarborough* (*Office, Dock Office Buildings, Victoria Terrace, West Hartlepool*)	Charles Fowling, *Principal Surveyor.* C. E. Burney J. W. Isherwood
	Engineer Surveyor, and Ship and Engineer Surveyors	R. Hirst W. J. Smith P. McGregor
HAVRE	(*Address, 28, Place de l'Hotel de Ville;* TELEGRAMS, *Wilkinson*)	Henri Wilkinson
	Assistant Ship and Engineer Surveyor	A. Cartier
HELSINGFORS	*Ship and Engineer Surveyor* ... ... (*Address, 16, Alexandersgatan*)	Hugo Lindfors
HOBART, TASMANIA	(TELEGRAMS, *Macmillan*)	Donald Macmillan
*HONG KONG	*Ship and Engineer Surveyor* (*Office, 9, Praya Central;* TELEGRAMS, *Marine*)	Newman Mumford
*HULL	(*Office, Bank Chambers, Land of Green Ginger, Hull*)	J. Thomson
	Ship and Engineer Surveyors	James Innes H. P. Cornish

LIST OF SURVEYORSHIPS (ALPHABETICALLY ARRANGED)—*continued.*

*IPSWICH	... ... (*Address, 35, Lower Orwell Street*)	Ebenezer J. Robertson
KOBÉ, HIOGO	*Ship and Engineer Surveyor* (TELEGRAMS, *Ellerton*)	James Ellerton
KURRACHEE	*Ship and Engineer Surveyor* ... ... (*Address, Persian Gulf Telegraphs, Manora, Kurrachee;* TELEGRAMS, *Hughes*)	J. Hughes
LA ROCHELLE	... ...	P. Tribot
LAS PALMAS	*Ship and Engineer Surveyor for Canary Islands* ...	
LEGHORN	... ... (TELEGRAMS, *A. Gori, Leghorn*)	Amerigo Gori
*LEITH	... ... (*Office, 56, Constitution Street*)	William Paulsen
	Ship and Engineer Surveyor	T. Field
LISBON	*Ship and Engineer Surveyor* ... (*Address, 8, Rua do Prata;* TELEGRAMS, *Piston*)	Alex. Henderson
*LIVERPOOL	(*Office, 12, Oriel Chambers, Water Street;* ... ... TELEGRAMS, *Register*)	William C. Davey, *Secretary and Principal Surveyor.* Edward C. Wheeler R. Williamson John Rutherford J. Bradley R. T. Johnson
	Engineer Surveyors, and Ship and Engineer Surveyors	Peter McGregor G. A. Milner J. Dykes L. G. Shallcross
LYTTELTON AND CHRISTCHURCH, N.Z.	... (*residing at Lyttelton*)	Stewart Willis
MALAGA	*Ship and Engineer Surveyor* (TELEGRAMS, *Lappe*)	Enrique Lappe
MALTA	*Ship and Engineer Surveyor* ... (*Office, 21, Strada Zaccaria, Valetta;* TELEGRAMS, *Register*)	C. H. Wright
*MANCHESTER	(*Office, 552, Chester Road, Old Trafford, Manchester*) *Ship and Engineer Surveyor*	J. W. Dimmock
MANILA	*Ship and Engineer Surveyor* (TELEGRAMS, *Dearnshaw*)	Daniel Earnshaw
MARSEILLES	*Ship and Engineer Surveyor* ... ... (*Address, 26, Rue de la République;* TELEGRAMS, *Vence*)	Jules Vence
MAURITIUS	(*residing at Port Louis;* TELEGRAMS, *McDonald, Mauritius*)	M. S. McDonald
MELBOURNE, VICTORIA	(*Office, 9, Queen Street;* TELEGRAMS, *Reports*)	William Watson
MESSINA	*and other ports in Sicily* (*See* NAPLES).	
*MIDDLESBOROUGH	*with Stockton* (*Office, Royal Exchange, Middlesborough*)	Jesse Williams, *Principal Surveyor.* A. B. Wilson J. D. Mares T. G. Baker
	Ship and Engineer Surveyors	John Sanderson R. Balfour R. Fowell F. W. Fillmore
MILFORD HAVEN	*Pembroke and Tenby, with a district extending as far as Newquay, inclusive* ... ... *Ship and Engineer Surveyor* ... ... (*Address, The Terrace, Neyland, R.S.O., South Wales;* TELEGRAMS, *Harris, Surveyor, New Milford*) ...	W. Harris

LIST OF SURVEYORSHIPS (ALPHABETICALLY ARRANGED)—*continued.*

MONTE VIDEO	(*Address, care of Messrs. Carlisle, Smith & Co., 29, Calle Rincon ;* TELEGRAMS, *Crocker*)	F. Crocker
MONTREAL	(*Address, Port Warden's Office ;* TELEGRAMS, *Portwarden*)	Archibald Reid
NAGASAKI	*Ship and Engineer Surveyor* (TELEGRAMS, *Robertson*)	David F. Robertson
NANTES	*Ship and Engineer Surveyor* ... ... (*Office, 44, Boulevard St. Aignan ;* TELEGRAMS, *Deprise*)	Joseph R. Deprise
NAPIER, N.Z.	... ...	A. Davidson
NAPLES	*with Messina and other ports in Sicily* ... ... *Ship and Engineer Surveyor* (*Residing at Torre Annunciata, near Naples ;* TELEGRAMS, *Ducoster, Torrannunziata*)	Francesco Ducoster
NEW ORLEANS	(*Address, care of Messrs. Marshall J. Smith & Co., 64, Baronne Street ;* TELEGRAMS, *Turley*)... ...	J. K. Turley
*NEW YORK	*Principal Surveyor for the United States* ... ... (*Office, Kemble Buildings, Whitehall Street ;* TELEGRAMS, *Nymdible*)	Thomas Congdon
	Ship and Engineer Surveyor	J. H. Mancor
NEWCASTLE, N.S.W.	... ...(TELEGRAMS, *Brooks*)	Thomas Brooks
	Engineer Surveyor	James Rorison
*NEWCASTLE-ON-TYNE	... ... (*Office, 3, St. Nicholas' Buildings*)	Henry J. Boolds, *Principal Surveyor.*
		James Sibun
		James McNeil
		Thomas H. Cooke
		Thomas Shilston
		J. W. Scullard
		Charles Skentelbery
		W. L. Gilmour
		J. French
	Engineer Surveyors, and Ship and Engineer Surveyors	J. H. Heck
		G. L. Hindmarsh
		H. Clarke
		G. A. Hake
		R. Haig
		R. F. Morton
		C. M. B. Dyer
		A. Boyd
		F. W. Pitt
	Inspector of Forgings	J. C. Craig
*NEWFOUNDLAND	... ... (*Address, 12, Gower St., St. John's ;* TELEGRAMS, *Surveyor*)	George Wheatley
*NEWPORT, MON.	*with Chepstow* ... ... *Ship and Engineer Surveyor* (*Office, 69, Dock Street*)	H. H. Ashton
NORDBY, FANÖ (Copenhagen District)	*Assistant Ship Surveyor*	L. J. Hansen
ODESSA	*Ship and Engineer Surveyor* (TELEGRAMS, *Crookston*) (*Acting also as Surveyor for Sebastopol*)	J. G. Crookston
OPORTO	*Ship and Engineer Surveyor* ... ... (*Office, 55, Rua da Reboleira ;* TELEGRAMS, *Ennor*)	Charles J. Ennor

LIST OF SURVEYORSHIPS (ALPHABETICALLY ARRANGED)—*continued.*

ORKNEYS	... ... (*residing at Stromness*)	Geo. Gunn Baillie
PARA	*Ship and Engineer Surveyor* (*Address, 51, Boulevard da Republica ;* TELEGRAMS, *Greaves, Para*)	Thomas Greaves
PENANG	... ... (TELEGRAMS, *Bradbery*)	E. Bradbery
	Engineer Surveyor ... ... (TELEGRAMS, *Dick*)	J. N. Dick
PHILADELPHIA	... ... *Ship and Engineer Surveyor* (*Office, 206, Walnut Place, Philadelphia*) ; (TELEGRAMS, *Haug, Philadelphia*)	John Haug
PIRÆUS	*Ship and Engineer Surveyor* (TELEGRAMS,)	James Stuart
*PLYMOUTH	*Ship and Engineer Surveyor* (*Office, 13, Exchange*)	George Duncan
PORT NATAL	... ... (TELEGRAMS, *Airth*)	Alexander Airth
PORTLAND, OREGON	... ... (TELEGRAMS, *Pope*)	George Pope
*PORTMADOC	... ...	John W. James
PRINCE EDWARD ISLAND	(*residing at Charlotte Town ;* TELEGRAMS, *Register, Charlotte Town*)	H. P. Welsh
QUEBEC	... ... (TELEGRAMS, *Brunelle, Quebec*)	P. D. Brunelle
*QUEENSTOWN	... ... (*Address, 24, The Beach*)	J. W. Attridge
RAMSGATE	... ...	Edward Jones
RANDERS (Copenhagen District)	*Assistant Ship Surveyor*	Poul F. Petersen
RANGOON	... ...(TELEGRAMS, *Winter*)	R. R. Winter
RIGA	... ... (*Address, Mantel Maschinen fabrik ;* TELEGRAMS, *Lindemann*)	C. A. Lindemann
	Engineer Surveyor ... ... (*Address, Pychau Dampfsagemühle ;* TELEGRAMS, *Hillbring*)	F. W. Hillbring
*RIO DE JANEIRO	*Ship & Engineer Surveyor* ... (*Office, 64 Rua 1° de Marco. Letters should be addressed to Caixa 741.* TELEGRAMS, *Register, Rio*)	A. S. Williamson
ROSTOCK	... ... (TELEGRAMS, *Cordes, Surveyor*)	W. Cordes
*ROTTERDAM	*Ship and Engineer Surveyor* (*Address, Vaste Land 16 ;* TELEGRAMS, *Vanollefen, Vasteland, Rotterdam*)	W. F. D. Van Ollefen
*ST. JOHN'S, N.F.L. (*See* NEWFOUNDLAND).		
ST. MICHAEL'S (*See* AZORES).		
ST. PETERSBURG	*Ship and Engineer Surveyor* ... ... (*Address, W.O., 9th Line, No. 24;* TELEGRAMS, *Wessblad, Petersburg*)	A. Wessblad
SAN FRANCISCO	... ... (*Address, 304, California Street ;* TELEGRAMS, *Freeboard, San Frisco*)	John Metcalfe
SEBASTOPOL	(*See* ODESSA).	
SHANGHAI	*Ship and Engineer Surveyor* ... (TELEGRAMS, *Sonne*)	H. Sonne
*SHEFFIELD	*with Birmingham, Newark and District* ... ... *Ship and Engineer Surveyor* ... ... (*Office, Buckingham Chambers, St. James St., Sheffield*)	C. Martell

LIST OF SURVEYORSHIPS (ALPHABETICALLY ARRANGED)—*continued.*

*SINGAPORE	*Ship and Engineer Surveyor* (*Office*, 7E, *Battery Road*) (TELEGRAMS, *Kidd*)	A. Kidd.
SOURABAŸA	... ... (TELEGRAMS, *Schipper*)	B. J. Schipper
*SOUTHAMPTON	*Ship and Engineer Surveyor* ... ... (*Office*, 3, *Oriental Place*)	R. W. Coomber
	Ship Surveyor	C. Edwards
STOCKHOLM	*Ship and Engineer Surveyor* ... ... (*Address*, *Skeppsmatningskontoret*, 46, *Skeppsbron*; TELEGRAMS, *Lloyd's Register*)	Albert Isakson
SUEZ	*Ship and Engineer Surveyor* ...(TELEGRAMS, *Metal*)	John Campbell
*SUNDERLAND	... ... (*Office*, 56, *John Street*)	John Lawrence, *Principal Surveyor.* William Bath W. L. Sharpe George Harrison D. McAuslan
	Engineer Surveyors	Patrick Salmon J. T. Findlay
	Inspector of Forgings	Hugh Cameron
*SWANSEA	*Ship and Engineer Surveyor* (*Office*, 1, *Gloster Place*)	J. Barclay
SYDNEY, N.S.W.	*Ship and Engineer Surveyor* (TELEGRAMS, *Miramar*)	R. Pollock
TRIESTE	(*Office*, *Via delle Poste Vecchie*, *Trieste*; TELEGRAMS, *Elias Florio*)	Elias Florio
	Engineer Surveyor for Trieste District ... ... (TELEGRAMS, *Schnabl*)	Frederick Schnabl
VALPARAISO	*Ship and Engineer Surveyor* (*Address*, *Casilla*, 934; TELEGRAMS, *Smith*, *Pacific*, *Valparaiso*)	A. F. Smith
VANCOUVER ISLAND	*Ship and Engineer Surveyor* ... ... (*Office*, 57, *Wharf Street*, *Victoria*, *B.C.*; TELEGRAMS, *Cartmel*, *Victoria*, *B.C.*)	Daniel Cartmel
VEENDAM	... (*Address*, *Kerklaan H.*, 785, *Veendam*; TELEGRAMS, *Hazewinkel*, *Expert*)	H. P. Hazewinkel
WATERFORD	*Ship and Engineer Surveyor*	Andrew Horn
WEXFORD	... ...	R. J. Sparrow
*WHITEHAVEN (*See* BARROW).		
YOKOHAMA	... ...(TELEGRAMS, *Efford*)	John J. Efford
	Engineer Surveyor ... ... (*Resident at Tokio*; TELEGRAMS, *Macnab*, *Tokio*)	A. F. Macnab

2, WHITE LION COURT, CORNHILL, LONDON.

April, 1897.

LLOYD'S REGISTER

OF

BRITISH AND FOREIGN SHIPPING.

RULES AND REGULATIONS.

Section 1. THE operations of the Societies of the two Register Books of Shipping formerly printed for the use of Merchants, Ship Owners, and Underwriters, having ceased in the year 1834, this Society was then established for the purpose of obtaining a faithful and accurate Classification of the Mercantile Shipping of the United Kingdom, and of the Foreign Vessels trading thereto, and for the government of which the following Rules and Regulations have been from time to time adopted.

Section 2. A Register Book to be printed annually for the use of Subscribers, containing the names of the Ships with other useful information, and the Character assigned, where the vessels are classed by the Society; also the names, &c., of all Ships of 100 tons and upwards unclassed by this Society.

Section 3. Each person subscribing the sum of Three Guineas per annum (or such other sum as the General Committee may fix) to be considered a Member of the Society, and entitled *for his own use* to one copy of the Register Book.

Section 4. The subscription of Marine Insurance Companies, Public Companies or Public Establishments to be Six Guineas per annum, for a single copy of the Register Book and £3 3s. per annum for every additional copy supplied, unless the copies be periodically posted with type with additions and corrections throughout the year, in which case the subscription for each copy supplied will be Ten guineas per annum.

Section 5. In the case of other Subscribers the subscription to be £3 3s. per annum for each copy, unless periodically posted with type with additions and corrections throughout the year, in which case the subscription will be £5 5s. per annum for each copy supplied.

Section 6. For the convenience of Subscribers not resident in London, or whose Register Books are not posted, a Supplement, containing the additions to, and corrections made in, the Register Book, to be printed fortnightly, in such convenient form as to admit of its transmission by Post, so that such parties may be furnished, from time to time, with the latest and most complete information.

Section 7. The superintendence of the affairs of the Society to be under the direction of a Committee of Merchants, Shipowners, and Underwriters: twenty-four elected in London and thirty-two at the principal Outports, and in addition, the Chairman, or, in his absence, the Deputy-Chairman of the Corporation of Lloyd's, and the Chairman, or, in his absence, the Deputy-Chairman of the General Shipowners' Society, for the time being, to be, *ex-officio*, Members of the Committee, but any member (except an ex-officio member) who fails to attend any meetings of the Committee for a period of six continuous months, without leave of absence, shall cease to be a member, and his place shall be filled up in the usual way.

NOTE.—*Official intimation to be given in June of each year whether the Chairman or Deputy-Chairman of the Corporation of Lloyd's, or the General Shipowners' Society, respectively, are to be the ex-officio members for the ensuing twelve months.*

Section 8. The General Committee reserve the right of varying or withdrawing the representation of Outports, as well as the mode of election of Members.

Section 9. Six of the Members elected in London, namely, two of each of the constituent parts of the Committee, to go out annually by rotation, but to be eligible to be re-elected. The vacancies so arising to be filled up by the election of two Underwriters and one Merchant by the Committee of Lloyd's, and two Shipowners and one Merchant by the Committee of the General Shipowners' Society.

Section 10. Of the Members elected at the Outports twenty-eight are to retire at the end of every *four* years, and four of the Members elected at Liverpool are to retire annually. The retiring Members are eligible for re-election.

Section 11. The Committee to appoint from their own body, annually, a Chairman and Deputy-Chairman, and also a Chairman for a Sub-Committee of Classification.

Section 12. The Committee to appoint a Sub-Committee of Classification, to be so regulated that each Member of the General Committee may, in rotation, take his turn of duty therein throughout the year.

Section 13. The Secretary, Clerks, and Servants of the Society, and the Surveyors, to be appointed by and be under the direction of the General Committee.

Section 14. Special meetings to be convened by order of the Chairman, or Deputy-Chairman, or on the requisition of any three Members.

Section 15. All elections and appointments to be made by ballot, excepting when in the election of Chairman, Deputy-Chairman, or Chairman of Classification, only one person is nominated for each office.

Section 16. No Member of the Committee to be permitted to be present on the decision of the classification of any ship of which he is the owner, or wherein he is directly or indirectly interested.

Section 17. 1. The Committee to be empowered to make such Bye-laws for their own government and proceedings as they may deem requisite, not being inconsistent with the original Rules and Regulations under which the Society was established; but no new Rule or Bye-law to be introduced, or any Rule or Bye-law altered, without special notice being given for that purpose at the Meeting of the Committee next preceding that at which such Motion is intended to be made; such notice to be inserted in the summons convening the meeting.

2. No new Rule, or alteration in any existing Rule, materially affecting the classification of ships, to take effect until the expiration of six months from the time it shall have been determined upon.

Section 18. All Reports of survey to be made in writing by the Surveyors according to the form prescribed, and submitted for the consideration of the General Committee, or of the Sub-Committees of Classification; but the character assigned by the latter to be subject to confirmation by the General Committee.

Section 19. 1. The reports of the Surveyors, and all documents and proceedings relating to the classification of ships are to be carefully preserved and to be open to the inspection of the Owners, but no other person or persons are to have access to such documents except with the written consent of the Owners and under the direction of the Chairman or Deputy-Chairman.

2. Copies of the original reports (if the ships be already classed, but not otherwise), so far as relates to the dimensions, scantlings, fastenings, and materials, in cases where the correctness of the reports in these particulars is certified by the builders, are granted on application.

Section 20. Foreign ships, and ships built in the British possessions abroad where there is not a Surveyor (*see also* Section 52 of the Rules for Wood Vessels), to be surveyed on their arrival at a port to which a Surveyor has been appointed; but a due regard is to be had to the circumstance of such vessels having been exempted from supervision while building, and the Character to be assigned to them is to be regulated according to their intrinsic quality and from the best information the Committee can obtain.

Section 21. In every case in which the Character assigned to a ship may be proposed, on survey, to be reduced, notice is to be given in writing to the Owner, Master, or Agent, with an intimation that if the reduction be objected to, the Committee will be ready to direct a special survey, on the Owner, Master, or Agent agreeing to pay the expenses attending the same, provided on the said survey there shall appear sufficient ground for the proposed reduction.

Section 22. 1. When the Surveyors consider repairs to be requisite, they are respectfully to communicate the same in writing to the Owner, Master, or Agent, and if such repairs be not entered upon within a reasonable time, a corresponding report is to be made, as soon as possible, to the Committee for their decision thereon.

2. All repairs of Ships or Machinery required at Ports where there is a Surveyor to this Society, in order to their obtaining a Character in the Register Book, or to their retaining the Characters assigned to them therein, must be carried out under the inspection, and to the satisfaction of the Society's Surveyors. Ships or machinery repaired at Ports where there is no Surveyor to this Society must be surveyed by one of the Society's Surveyors at the earliest opportunity.

Section 23. Parties considering the repairs suggested by the Surveyor to be unnecessary or unreasonable may appeal to the Committee, who will direct a special survey to be held; but should the opinion of the Surveyor be confirmed by the Committee, then the expense of such special survey is to be paid by the party appealing.

Section 24. The Surveyors to the Society not to be permitted (without the especial sanction of the Committee) to receive any fee, gratuity, or reward whatsoever for their own use or benefit, for any service performed by them in their capacity of Surveyors to this Society, on pain of immediate dismissal.

Section 25. The Surveyors will be directed to attend on Special Surveys of ships or machinery while building or under damage or repair, when required by Merchants, Shipowners, or Underwriters; the charge for which is to be regulated according to the nature and extent of the service performed. In all cases, the application for the assistance of the Surveyors must be made in writing addressed to the Secretary.

FUNDS.

Section 26. The Funds to be under the authority and control of the Committee, and a statement of the Receipts and Expenditure to be annually printed for the information of the subscribers.

Section 27. The following Fees to be charged to the Owners of ships prior to their vessels being classed and registered in the book :—

I.

Classing Fees.

For First Entry of Class in the Register Book.

For each Ship under 200 Tons				£1	0	0
Ditto	of	200 and under 500 Tons		2	0	0
Ditto	of	500 „ 1,000 „		3	0	0
Ditto	of	1,000 „ 2,000 „		4	0	0
Ditto	of	2,000 and upwards		5	0	0

For First Entry of Notification "LMC" in the Register Book.

For each Ship under 100 registered HP.			£1	0	0
Ditto	of	100 and under 300 HP.	2	0	0
Ditto	of	300 and above	3	0	0

II.

Office or Registration Fees by the Society's Non-Exclusive Surveyors.

(A.)

Chargeable on Vessels surveyed, for Special Surveys No. 1, No. 2, and No. 3.

For each Ship under 500 Tons			£0	10	0
Ditto	of	500 and under 1,000 Tons	1	0	0
Ditto	of	1,000 „ 2,000 „	1	10	0
Ditto	of	2,000 and upwards	2	0	0

(B.)

For all other Surveys which have to be Reported to the Committee on Official Forms.

For each Ship £0 10 0

In cases where Surveys are held on the hulls and machinery of vessels, this fee is to be charged only on one of the Surveys.

SPECIAL SURVEYS.

Section 28. 1. For ships built under the special superintendence of the Surveyors (to entitle them to the distinctive mark ✠), 1s. per ton for the first 1,000 tons, and 6d. per ton for every ton beyond 1,000 tons.

2. For machinery or new boilers built under the special superintendence of the Surveyors (to entitle them to the distinctive mark ✠ in red) :—

3. For engines and boilers up to 200 horse-power, 3 shillings per horse-power. For engines over 200 horse-power, 3 shillings for the first 200 horse-power, and 1 shilling per horse-power above 200. No fee to be less than £8 0s. 0d.

4. The following rule is to be used for determining the Nominal Horse Power of Engines in regulating the fees for their survey, viz. :—

$$\text{NHP} = \frac{\text{P} + 340}{1000}\left(\frac{\text{D}^2\sqrt{\text{S}}}{100} + \frac{\text{H}}{15}\right) \text{ where the boiler pressure is below 160 lbs.}$$

$$= \frac{\text{P} + 590}{1500}\left(\frac{\text{D}^2\sqrt{\text{S}}}{100} + \frac{\text{H}}{15}\right) \text{ where the boiler pressure is 160 lbs. or above.}$$

If the boilers are fitted with Forced Draught or Induced Draught appliances, then $\frac{\text{H}}{12}$ is to be taken instead of $\frac{\text{H}}{15}$.

where D = diameter of L.P. Cylinder in inches.
S = stroke in inches.
H = heating surface in square feet.
P = working pressure in lbs. per square inch.

The square feet of heating surface represented by H will comprise the surfaces of the tubes, of the back tube plate or plates, and of the furnace and combustion chamber plating down to the level of the fire bars.

5. For the survey and testing of each Donkey Boiler, a fee of two guineas to be charged.

6. For Surveys for damage, or for other Surveys held at the request of the Owners, and for the Survey of Ships for Restoration, Continuation, or the character A in Red, and for Occasional Surveys and Surveys of repairs by the Society's Surveyors at Foreign ports, a charge will be made according to the nature and extent of the service performed.

7. **SPECIAL PERIODICAL SURVEYS, Nos. 1, 2, and 3.**

For the special periodical surveys of Iron and Steel Vessels, when such surveys are held by the Society's exclusive Surveyors in the United Kingdom.

	S.S. No. 1. £ s.	S.S. No. 2. £ s.	S.S. No. 3. £ s.
For Vessels under 200 tons gross ...	1 10	2 10	3 10
Ditto „ 300 „ ...	2 10	3 10	4 10
Ditto „ 400 „ ...	3 0	4 0	5 0
Ditto „ 800 „ ...	3 10	4 10	6 0
Ditto „ 1,200 „ ...	4 0	5 0	7 0
Ditto „ 1,800 „ ...	4 10	5 10	8 0
Ditto „ 2,500 „ ...	5 0	6 0	9 0
Ditto „ 3,500 „ ...	5 10	6 10	10 0
Ditto of 3,500 „ and above	6 0	7 0	10 0

SPECIAL PERIODICAL SURVEYS OF MACHINERY.

Held at the Special Surveys, Nos. 1, 2, and 3.

For each Ship under 50 registered HP	£2 10 0
Ditto „ 100 „	3 10 0
Ditto „ 150 „	4 0 0
Ditto „ 200 „	4 10 0
Ditto „ 300 „	5 0 0
Ditto of 300 „ and above	5 10 0

SPECIAL ANNUAL SURVEYS OF BOILERS.

To be held when and after the Boilers are six years old.

For each Ship having 1 boiler	£1 0 0
And for each additional boiler (including the donkey boiler) ...	0 10 0
But the fee in no case to be more than	3 0 0

8. In cases where the caulking of ships is superintended and tested by the Surveyors, a special charge will be made, according to the tonnage of the ship.

9. All repairs which may be required on the Surveys above referred to, must be performed under the superintendence of the Society's Surveyors. (*See also* Section 22.)

MEM.—It is to be understood that in all cases where travelling expenses are incurred by the Surveyors in connection with the above services, they are to be defrayed by the parties interested in the same.

Section 29. The class of a vessel is liable to be withheld, or, if already granted, may be withdrawn or expunged from the Register Book in the case of non-payment of any fees or expenses chargeable on account of such vessel.

Section 30. Certificates of Character, on the Form No. 7, or of "LMC," or "B&MS," on Forms Nos. 10 or 11, signed by the Chairman, the Deputy-Chairman, or the Chairman of the Sub-Committee of Classification, and countersigned by the Secretary, will be granted on application.

FREEBOARD.

Section 31. Fees for the Survey for, and assignment of, Freeboard to vessels :—

For Classed Vessels under 300 tons gross	£1 1 0
Ditto ditto of 300 tons and under 1000 tons gross	2 2 0
Ditto ditto 1000 „ „ 2000 „	3 3 0
Ditto ditto 2000 „ „ 3000 „	4 4 0
Ditto ditto 3000 „ „ 4000 „	5 5 0
Ditto ditto 4000 „ and above	6 6 0

Section 31a. Rules, complete, 10s. each copy. If for Wood Ships and Composite Ships, 5s. For Iron and Steel Ships, 5s.

LONDON,

17th December, 1896.

LLOYD'S REGISTER

OF

BRITISH AND FOREIGN SHIPPING.

RULES FOR STEEL VESSELS.

1897—98.

RULES

FOR

THE BUILDING AND CLASSIFICATION OF STEEL VESSELS.

1. **Steel Vessels** will be classed A with a Numeral prefixed, so long as, on careful annual and periodical Special Surveys, they are found to be in a fit and efficient condition for the safe conveyance of dry and perishable cargoes.

It is to be distinctly understood that the numerals prefixed to the letter A do not signify terms of years, but are intended for the purpose of comparison only; the A character assigned being for an indefinite period, subject to annual and periodical Survey as hereinafter described.

2. 100A, and 90A, will denote vessels that have been built in accordance with, or equal to, the Rules, and Tables S 1 to S 8. Deviations from the Rules will be allowed, provided that a sketch of the midship section, plans, &c., showing the proposed scantlings and arrangements in each case, be first submitted through the resident Surveyors, and approved by the Committee; and provided also that the vessels be built in accordance with the approved plans, under the survey of the Surveyors of this Society.*

3. Vessels which do not fulfil the requirements for the 100A class, but which are superior to vessels built on the 90A scale, may, if the Committee approve, be classed 95A.

4. If, upon survey of any vessel, material reduction is found to have taken place in the thickness of the plating and angles, the comparative numeral prefixed to the A will be reconsidered by the Committee.

5. In the cases of vessels intended to load or discharge while lying aground, it is recommended that the bottoms be additionally strengthened, in order to withstand the exceptional strains to which they may be subjected.

6. Vessels which are intended for special trades or purposes, and which are considered by the Committee to be fit for the contemplated employment, may be classed A, provided all the details of the proposed scantlings and arrangements be submitted to the Committee and approved by them; and provided the approved plans be carried out to the satisfaction of the Society's Surveyors.

7. To the class A, in such cases as those referred to in paragraph 6, will be affixed a designation, showing the particular trade or purpose for which the vessels are intended, thus:—A "For River purposes only"; A "For Tug purposes"; A "Fishing Smack"; A "For Channel purposes"; &c.

8. In the cases of vessels intended for Channel purposes, the particular Channel will be defined thus: "Bristol Channel," "Irish Channel," "English Channel," "Newhaven—Dieppe," &c. Moreover, as a condition of the classification of a vessel intended for Channel purposes, a minimum freeboard must be submitted to and approved by the Committee; and the freeboard thus sanctioned must be inserted in the Certificate and in the Register Book, and marked on the vessel's sides as hereafter described.†

In all such cases, if the vessel has for any reason forfeited her character, the freeboard assigned as a condition of classification will be omitted in reprinting the Register Book, unless the character be previously reinstated.

* In vessels building, or to be built, under contract for classification, deviations from the Rules will not be allowed by the Committee, unless the Builder shall previously obtain the sanction of the Owner.

† *See* Notice of Freeboard requirements printed at end of the Rules.

9. In cases in which the freeboard assigned to a vessel is a condition of the class, the words "*with freeboard*" will be inserted under the character in the Register Book; and any vessel classed with this condition, which proceeds to sea with a less freeboard than that approved by the Committee, or on which the freeboard mark is placed higher than the position assigned by the Committee, will be liable to have her class expunged from the Register Book.

10. The efficient state and condition of the whole of a vessel's equipment will be designated by the figure 1 placed after the character assigned to the vessel; and in cases in which the equipment is found insufficient in quantity or defective in quality, a dash thus –, will be inserted in place of the figure 1.

11. To entitle vessels classed A "For Channel Purposes" to the Figure 1, the equipment of Anchors and Chain Cables, &c., should be as required by Table 22, with the exception that not more than two bower anchors and one stream anchor need be supplied. The first bower anchor should be of the full weight required by the table, and the second bower may be 15 per cent. lighter. This rule, however, applies only to vessels intended for short passages.

12. In vessels classed "For Channel Purposes" which are intended for longer voyages, such as the Queenboro' and Flushing, the Channel Islands, or the Irish Sea service, the equipment must be in accordance with the requirements of Table 22.

13. When the rules as regards surveys on the hull, machinery or boilers of a steam vessel, or on the hull, masts, spars, or rigging of a sailing vessel have not been complied with, so that the vessel is not entitled to retain her class in the Register Book, the character will be expunged with a red line, under which the date of such withdrawal of class will be recorded.

14. When it is found from *reported defects* in the hull, machinery or boilers of a steam vessel, or in the hull, masts, spars, or rigging of a sailing vessel, that the vessel is not entitled to retain her class in the Register Book, the character will be expunged with a black line, under which the date of such withdrawal of class will be recorded.

15. When the class of a vessel is withdrawn from the Register Book by the Committee in consequence of a request from the Owner, the fact will be indicated by the insertion of three dots (...) in column 7 of the list of steam vessels and column 8 of the list of sailing vessels.

16. To entitle STEEL VESSELS to retain the Characters assigned to them in the Register Book, they are required to be subjected to the following Special Surveys, designated No. 1, No. 2, and No. 3, respectively. In addition, the machinery and boilers of steam vessels are required to be submitted to the periodical surveys described on pages 103 and 104.

17. The periods at which the surveys on the hull are intended to be held, in cases of vessels classed from 100A to 90A inclusive, are when a vessel is 4 years, 8 years, and 12 years old respectively, and at like periods from the date when the No. 3 Survey was held.*

N.B.—In order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage or from other causes, rests with the Owners, Masters, or Agents.*

* Should a ship at any time be submitted to Special Survey No. 3 before being 12 years old, the Subsequent Special Surveys may be Nos. 1, 2 and 3, consecutively, dating from the completion of such No. 3 Survey.

18. In every case the date of build of a vessel is to be reckoned from the last date of the survey for first entry of classification, when such survey is completed within six months of the date of launching : but when the first entry survey is not completed within that period then the date of build will be reckoned from six months after the date of launching. The date when the special periodical surveys respectively become due is to be calculated from the date of build, as above described, or the last date of the No. 3 Survey.

19. Similarly, vessels classed A for special purposes must be subjected to a special survey every *three* years, as per Nos. 1, 2, and 3, and afterwards as per Nos. 1, 2, and 3, consecutively.

20. In any case in which it may suit the convenience of the Owners, the special surveys Nos. 1 and 2 may be held at any time within twelve months previous to the expiration of the period when they severally become due, and the special survey No. 3 may be held at any time before the date when it becomes due.

21. To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months from the date when the survey became due.

22. When a special survey is only partially held, the Surveyors must give the Owners or their Agents written notice of the parts not surveyed, and also report the facts to the Committee.

23. If a vessel is at a port in the United Kingdom after the expiration of the prescribed period for survey, and is not subjected to the special survey then due before leaving the United Kingdom, the word "*Expired*" will be inserted against her character in the Register Book ; and in no case will a vessel be allowed to retain her class if she has not been subjected to the whole of the requirements of the requisite special survey within twelve months from the date when the survey became due.

24. Vessels which have undergone either of the foregoing examinations will be noted in the Register Book, thus :—*ss*No. 1–96, *ss*No. 2–96, *ss*No. 3–9,96, 2nd *ss*No. 3–9,96, indicating the special survey and date thereof.

25. Whenever the engines or boilers are taken out, the bearers, with the floor-plates, keelsons, rivets, &c., under them, are to be surveyed ; and whenever the bottom plating is to be cemented a survey is to be held prior to the cement being laid.

*Survey No. 1.

1. The vessel to be placed on blocks of sufficient height in a dry dock or on a slipway, proper stages to be made and the holds and peaks to be cleared ; the limber boards and ceiling equal to not less than two strakes fore and aft on each side removed, one of which is to be taken from the bilges. Where the ceiling in the flat of bottom is fitted in hatches, the whole of the hatches and one strake of ceiling at the bilges are to be removed,† and both surfaces of outside plating exposed,‡ and cleaned and coated where necessary.

2. The coal bunkers to be cleared for examination, and ceiling removed as in the holds.

* To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months from the date when the survey became due. The Surveyors in such cases are to give the Owners, or their agents, written notice of the parts not surveyed, and are also to report the same to the Committee.

† In the case of vessels fitted with double ceiling, application may be made to the Committee if any relaxation be required.

‡ In cases where the inner surface of the bottom plating is coated with cement, or asphalt, if the coating be carefully inspected and tested, by beating or chipping, and found sound and adhering satisfactorily to the steel, its removal may be dispensed with.

3. In all vessels the masts, spars, and general equipment must be in good and efficient condition.

4. If the vessel has a double bottom, the ceiling must be removed therefrom and the efficiency of the tanks tested by a head of water to the height of the light water-line. Where deep water ballast tanks are fitted, their water-tightness to be tested by a head of water not less than 8 feet above the crown of the tank.

5. When a deck originally required to be 4 inches thick is worn to 3 inches, $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches, 3 inches to $2\frac{1}{2}$ inches, it must be renewed, unless it be found on survey to be in good condition, when on application the case will receive the consideration of the Committee.

6. Note.—*At the Special Survey No.* 1 *succeeding No.* 3, *the chain cables are to be ranged for inspection.* When any length of a chain cable is worn so that the sectional area at its most worn part is reduced by $\frac{1}{5}$th from the original area, it should be renewed.

7. In Steam Vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors.

8. The steam steering engine and its connections to be examined.

9. For periodical Surveys of Engines and boilers, *see* pages 103 and 104.

*Survey No. 2.

1. The vessel to be placed on blocks of sufficient height in a dry dock or on a slipway, proper stages to be made and the holds and peaks to be cleared; the limber boards and ceiling not less than *three* strakes fore and aft on each side removed, one of which is to be taken from the bilges. Where the ceiling in the flat of bottom is fitted in hatches, the whole of the hatches and one strake of ceiling at the bilges are to be removed,† and both surfaces of outside plating exposed,‡ and cleaned and coated where necessary.

2. The coal bunkers to be cleared for examination, and ceiling removed as in the holds.

3. The windlass at this and all subsequent alternate special surveys to be unhung, where necessary, and its wood linings sufficiently stripped, for examination. The chain cables are also to be ranged for inspection at this and all subsequent special surveys. When any length of a chain cable is worn so that the sectional area at its most worn part is reduced by $\frac{1}{5}$th from the original area, it should be renewed.

4. In all vessels the masts, spars, and general equipment must be in good and efficient condition.

5. If the vessel has a double bottom, the ceiling must be removed therefrom, and the efficiency of the tanks be tested by a head of water to the height of the light water-line. Where deep water ballast tanks are fitted, their water-tightness to be tested by a head of water not less than 8 feet above the crown of the tank.

6. After a vessel has passed No. 3 Survey, in addition to the survey prescribed for No. 2, when that survey becomes due, ceiling should be lifted at other parts of the vessel where deemed necessary by the Surveyors to enable them to satisfy themselves as to the condition of the vessel.

* To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months from the date when the survey became due. The Surveyors in such cases are to give the Owners, or their agents, written notice of the parts not surveyed, and are also to report the same to the Committee.

† In the case of vessels fitted with double ceiling, application may be made to the Committee if any relaxation be required.

‡ In cases where the inner surface of the bottom plating is coated with cement, or asphalt, if the coating be carefully inspected and tested, by beating or chipping, and found sound and adhering satisfactorily to the steel its removal may be dispensed with.

7. When a deck originally required to be 4 inches thick is worn to 3 inches, $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches, 3 inches to $2\frac{1}{2}$ inches, it must be renewed, unless it be found on survey to be in good condition, when on application the case will receive the consideration of the Committee.

8. The steam steering engine and its connections to be examined.

9. In Steam Vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. *See* pages 103 and 104.

*Survey No. 3.

1. TO BE HELD BY TWO SURVEYORS, ONE TO BE AN OFFICER OF THE SOCIETY.—The vessel to be placed on blocks of sufficient height in a dry dock or on a slipway ; proper stages to be made and the holds and peaks to be cleared ; all the close ceiling to be removed, so that the rivets, plates of keel, and flat of bottom may be thoroughly examined ; coal-bunkers of steam-vessels to be cleared, the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulkheads, rivets and inner surface of the plating to be exposed, and where side lights are fitted, the condition of the plating in way of the same to be ascertained. All oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, sternpost, and rudder ; the planksheers and waterways, if of wood, to be scraped bright. When the vessel is thus prepared, the Surveyors are to ascertain the thickness of the plating by having holes drilled in such parts as may be deemed necessary,† and to furnish a detailed statement of the thicknesses in their report.

2. Such parts as may be found defective, or materially less than the required substance by Rule, are to be removed and replaced with proper materials, equal in substance and quality to the original construction.‡ The planksheers, waterways, flat of decks and their fastenings, are also to be examined and made good where necessary.

3. In all vessels the masts, spars, and general equipment must be in a good and efficient condition. All mast and bowsprit wedging at this and subsequent Special Surveys to be removed, unless the plating of iron or steel masts and bowsprits is doubled in way of the same, when it will only be necessary to remove the wedging at the Special Surveys, No. 3. Iron or steel masts, bowsprits, and yards to be carefully tested by hammering and if the plates are considered by the Surveyors to be materially wasted at any part, the thickness is to be ascertained by drilling.

NOTE.—*The masts and spars are to be subject to examination by the Surveyors when deemed necessary by them on other occasions besides Special Surveys.*

4. If the vessel has a double bottom, the ceiling must be removed therefrom and the efficiency of the tanks tested by a head of water to the height of the light water-line. Where deep water ballast tanks are fitted, their water-tightness to be tested by a head of water not less than 8 feet above the crown of the tank.

* To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months from the date when the survey became due. The Surveyors in such cases are to give the Owners, or their agents, written notice of the parts not surveyed, and are also to report the same to the Committee.

† In cases where the inner surface of the bottom plating is coated with cement, or asphalt, if the coating be carefully inspected and tested by beating or chipping and found sound, and adhering satisfactorily to the steel, its removal may be dispensed with.

‡ Where the deterioration in thickness is widespread, and it is not deemed advisable by the Owner to renew the material, on a detailed report being made by the resident Surveyor, the class of the vessel will be reconsidered.

5. When a deck originally required to be 4 inches thick is worn to 3 inches, $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches, 3 inches to $2\frac{1}{2}$ inches, it must be renewed, unless it be found on survey to be in good condition, when on application the case will receive the consideration of the Committee.

6. The chain cables are to be ranged for inspection. When any length of a chain cable is worn so that the sectional area at its most worn part is reduced by $\frac{1}{5}$th from the original area, it should be renewed.

7. The steam steering engine and its connections to be examined.

8. In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. *See* pages 103 and 104.

Second Special Survey No. 3.

1. The vessel must be submitted to the same survey as before described for *Survey No. 3*, with the following additions:—

2. The condition of the scantlings must be ascertained, the shell plating to be drilled at such parts as the Surveyors may consider necessary to satisfy themselves as to its thickness, the number of holes on each side in no case being less than the number of strakes of plating not covered with cement in the vessel.

3. Care should be taken especially to ascertain the extent of deterioration of steamers in way of the side bunkers and boilers.

4. A sketch showing the thickness at the parts where drilled is to accompany the report on the vessel, for the consideration of the Committee.

5. The plating in way of cement in the bottom need not be drilled, provided the cement be found to be adhering satisfactorily to the plating, and the Surveyors consider drilling unnecessary.

6. In cases where the requirements of the Second Special Survey No. 3 may have been fully complied with, before the expiration of the period when the survey becomes due under the Rules, the fact will, if desired by the Owners, be noted in the Register Book. Such notation, however, will not exempt a vessel from the compliance with the requirements of the survey as regards drilling when she is 24 years old, or at the first Special Survey held after that time, unless the drilling has been done at the previous Special Survey.

SURVEYS WHILE BUILDING.

1. The Surveyors are to examine during the progress of a vessel, the materials and workmanship, from the laying of the keel to her completion; and to point out as early as possible anything that is objectionable, or that is not in accordance with the Rules, or with the plans approved by the Committee for the particular vessel.

2. Vessels built under the Special Survey of the Society will be entitled to the distinctive mark ✠.

3. In steam vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey. *See* pages 92 to 103.

4. In steam vessels the machinery and boilers are to be inspected throughout construction, the boilers tested by hydraulic pressure, and the machinery tested under steam. Machinery certificates will be granted, and notifications thereof made in the Register Book, thus: "LMC 9,96" *in red* (*i.e.* LLOYD'S MACHINERY CERTIFICATE, September, 1896).

5. In cases of machinery or new boilers being built under Special Survey, the distinguishing mark ✠ will be noted in red, thus: "✠LMC," or "✠NE&B," or "✠NB."

6. In cases in which the machinery or boilers are of novel description, or in which experience has not sufficiently shown the safety of the principle or mode of application involved, the words "Machinery Experimental," or "Boiler Experimental," will be inserted under the class of the vessel in the Register Book; but if in the opinion of the Committee the machinery or boilers are so far inefficient as to imperil the vessel's safety, no class will be assigned.

7. If the hull of a steamer has been built in accordance with the Rules, a provisional certificate will be issued, if desired, stating the class to which the vessel will be entitled when the machinery and boilers have been fitted on board in accordance with the Rules, and the Committee's requirements otherwise complied with.

8. For requirements relating to the survey and construction of engines and boilers, *see* pages 92 to 104.

RULES FOR THE BUILDING OF STEEL VESSELS.

Section 1. 1. In all cases where it is proposed to build ships of steel for classification in the Register Book, a sketch of midship section with longitudinal, deck, and other plans showing the details of the scantlings and arrangements, must in the first place be submitted for the approval of the Surveyors, and in all cases where deviations from the rules are proposed they must be submitted for the approval of the Committee, and the vessel must be built under special survey to the plans approved and otherwise in accordance with the following Rules, subject to such modifications as may be deemed necessary by the Committee.*

2. The scantlings given in Tables S 1, S 2, and S 3, are intended for vessels the length of which does not exceed *eleven times* their depth from the top of keel. Where this proportion is exceeded *see* Sec. 46 and Table S 6.

3. For proportions of breadth to length see Table S 5.

4. The measurements for regulating the scantling numbers and proportions are to be taken as follows:—

LENGTH.

5. The length to be measured from the after part of the stem to the fore part of the stern-post on the range of the upper deck beams in one, two, and three decked and spar-decked vessels, but on the range of main deck beams in awning-decked vessels.

6. In vessels where the stem forms a cutwater the length is to be measured from the place where the upper deck beam line would intersect the after edge of stem if it were produced in the same direction as the part below the cutwater.

BREADTH.

7. The breadth is in all cases to be the greatest moulded breadth of the vessel.

* The rivets, keel, stem, stern-frame, rudder and pillars may be of iron of the sizes given by the rules for steel vessels; also the floors, girders, and top plating of double bottoms, coal bunker, and other bulkheads, shaft tunnels, casings round engines, hatchway coamings, poops, forecastles, bulwarks and deck erections may be of iron of the size required by the rules for iron vessels. All liners may be of iron, but no other parts of such ships are to be of iron without the special sanction of the Committee.

DEPTH.

8. The depth in one and two-decked vessels is to be taken from the upper part of the keel to the top of the upper deck beam at the middle of the length, assuming a normal round up of beam of one quarter of an inch to a foot of breadth. In Spar-decked vessels and Awning-decked vessels the depth is to be taken from the upper part of the keel to the top of the main deck beam at the middle of the length, with the above normal round up of beam. For "Three-deck" steam vessels *see* Section 41.

SCANTLINGS.

Section 2. 1. The scantlings and spacing of the frames, reversed frames, and floor-plates, the thickness of bulkheads and the diameter of pillars in Table S 1 are regulated by numbers, which are produced as follows :—

2. For one and two-decked vessels.—The number is the sum of the measurements in feet arising from the addition of the half-moulded breadth of the vessel at the middle of the length, the depth from the upper part of the keel to the top of the upper deck beams, with the normal round-up, and the girth of the half midship frame section of the vessel, measured from the centre line at the top of the keel to the upper deck stringer plate.

3. For "Three-deck" steam vessels.—The number is produced by the deduction of 7 feet from the sum of the measurements taken to the top of the upper deck beams. (*See* Section 41.)

4. For Spar-decked vessels and Awning-decked steam vessels.—The number is the sum of the measurements in feet taken to the top of the main deck beams, as described for vessels having one or two decks. (*See* Sections 42 and 43.)

5. The scantlings of the keel, stem, stern-frame, keelson and stringer plates, the thickness of the outside plating and deck ; also the scantlings of the angle bars on beam stringer plates, and keelson and stringer angles in hold, as in Tables S 2, S 3, S 5, and S 7, are governed by the number obtained by multiplying that which regulates the size of the frames, &c., by the length of the vessel.

6. In vessels of exceptional fineness of form, intended for passenger traffic, or to carry a limited amount of cargo with a fixed freeboard, a modification in the scantlings will be admitted, subject to all particulars being submitted by the Builders, and the deviations from the scantlings required by the rules being sanctioned by the Owner.

7. For Turret deck vessels—Depth.—The depth is to be taken from the upper part of the keel to the top of a normal beam line drawn through the point where a vertical line at the quarter breadth of the vessel cuts the upper surface of the vessel's deck ; or, the upper surface continued, where the Turret is nearly one-half the breadth of the vessel, and its transverse section is of rounded form at the base. (*See sketch* A, page 122.)

8. Scantling Numbers.—In vessels of the Turret deck type, *having no sheer*, the first number for scantlings may be reduced by one-half of the standard mean sheer, as set forth in the Freeboard Tables, for a length equal to twelve times the moulded depth of the vessel, measured from top of keel to top of normal beam line at base of Turret, provided that the breadth of the Turret is not greater than one-half the moulded breadth of the vessel, and the radii of the gunwale and base of Turret curves be from 20 to 25 per cent. and 15 to 20 per cent. respectively of the moulded depth.

9. For vessels of under 24 feet in depth, the measurements are to be taken to the normal beam line as described, but for vessels 24 feet in depth and above, the measurements are to be taken to a point 7 feet below the normal beam line at base of Turret. (*See sketch* B, pages 123 & 124.)

10. The second number for scantlings is to be obtained by multiplying the first number by the length of the vessel.

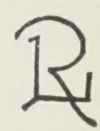
11. In vessels of this type having strongly constructed continuous superstructures, the material of the sheerstrakes, stringer plates and deck plating, as arranged in a vessel of ordinary form should be distributed over the plating of the upper part of the vessel, and the sides of the superstructure, provided that the thickness of the rounded deck plating is not less than $\frac{1}{20}$ of an inch below that of the side plating and that the turret sheerstrake is not less than $\frac{1}{20}$ of an inch below that of the main sheerstrake, as given in Table S 2. Where a second deck is dispensed with, compensating strength must be afforded either by increasing the depth of the web frames, and extending them to the upper part of the rounded gunwale, where web frames are fitted in lieu of hold beams, or by other means.

12. If in such vessels of under 24 feet depth the length exceeds eleven times the depth, additional strength will be required, as shown in Table S 6, but in vessels of 24 feet depth and above the proportions are to be taken from the depth measured to a point 7 feet below the normal beam line at base of Turret, and they may be 13 and under 14 depths in length, before they are required to have the remaining extra strength at upper part prescribed for vessels of 11 to 12 depths in length, and above these proportions in the same ratio; but in no case will the material at the upper part, and the number and thickness of steel or iron decks, be required to be greater than that of a three deck vessel of the same dimensions.

QUALITY OF STEEL.

Section 3. 1. The steel will be required to withstand the whole of the following tests, to be applied at the Steel Works under the personal inspection of the Society's Surveyors, to samples selected by them from every charge or cast employed in the manufacture of the material, and these samples when marked by them for testing, should be followed by the Surveyors through the different stages of preparation until the tests are completed.

2. The Committee will require that every plate, beam, and angle supplied for these ships shall be clearly and distinctly stamped by the Manufacturer in two places where the brand cannot be conveniently sheared off, after they have been tested, the brand to be similar to the following, thus :—



denoting that a shearing from the plate or angle so marked has successfully been bent cold after being tempered as described in the temper test which follows, and that the plate or angle in question is capable of withstanding the *whole* of the tests hereafter described; and the Committee will require the Surveyors, when in constant attendance at the Steel Works, to satisfy themselves, so far as may be practicable, that these conditions are being complied with in a *bonâ fide* manner.

3. All plates, beams, and angles to be legibly stamped in two places with the manufacturer's name or trade mark, and the place where made, which is also to be stated in the report of survey.

4. Should the samples selected by the Surveyor not fulfil the test requirements, the plates or angles from which they were cut are to be rejected, and further tests are to be made before any material from the same charge can be accepted.

5. When one of the Society's Surveyors is not in constant attendance at the Steel Works for the purpose of seeing the material tested, the Committee will require that tensile, and temper and cold bend tests shall be applied, either at the Steel Works or at the Ship-yard, to not less than one plate, angle bar, or bulb plate in every batch of 50, or a batch of less number; but the Surveyor is not to select samples for testing until the material has been tested, stamped, and appropriated by the manufacturer. The sample, when marked by the Surveyor for testing, is to be followed by him when practicable through the different stages of preparation until the tests are completed. Should the samples tested not fulfil the test requirements, the whole of the material from the charge which produced the samples which fail to withstand the tests prescribed is to be rejected, or further tests are to be applied to a sample from each of the other charges of which the batch is composed. In the event of any of these samples also failing, the whole of the material from the same charge or charges is to be rejected as in the first instance.

6. Before these sample tests have been applied to a batch of steel submitted for check testing, the Surveyor is to be furnished with a Certificate by the Manufacturer to the effect that the Society's requirements as to the testing of steel have been complied with in the case of the batch in question.

7. In the event of the material failing, in any case, to withstand the prescribed tests, the brands approved by the Committee and stamped on the plates, beams, and angles by the Manufacturer are to be defaced by punch marks extending beyond the brand in the form of a cross, thus :—

denoting that the material is rejected.

8. The Society's Surveyor will require to have every facility placed in his way for tracing all plates, beams, and angles to their respective charges, and to be furnished with two copies of the advice notes of the material, one of which, when he shall have been satisfied with the results of the tests applied to the material, he is to sign, to be forwarded by the Manufacturers to the Shipbuilders, and the other of which is to be forwarded by him to the Society's Surveyors at the port where the vessel is to be built.

STEEL SUPPLIED IN INGOTS.

9. Where steel is not produced in the steel works at which it is rolled, a Certificate is to be supplied to the Surveyor testing the material, setting forth the name of the Manufacturer who supplied it, the process of manufacture, and the numbers of the "charges," for reference to the books of the Manufacturer if considered necessary, and the number of the "charge" is to be marked on each plate or angle for the purpose of identification.

TESTS.

10. Strips cut lengthwise or crosswise of the plate, angle, and bulb steel, to have an ultimate tensile strength of not less than 28, and not exceeding 32 tons per square inch of section, with an elongation equal to at least 20 per cent. on a length of 8 inches before fracture in samples $\frac{8}{20}$ of an inch and above in thickness, and 16 per cent. in samples below this thickness. Steel plates intended for garboard strakes, if specially marked for identification, may be tested to within the minimum limit allowed for boiler plates, viz., 26 tons tensile strength per square inch.

11. Steel angles intended for the framing of vessels, and bulb steel for beams, may have a maximum tensile strength of 33 tons per square inch of section, provided they be capable of withstanding the bending tests, and of being efficiently welded.

12. Strips cut from the plate, angle, or bulb steel to be heated to a low cherry-red, and cooled in water of 82° Fahrenheit, must stand bending double round a curve of which the diameter is not more than three times the thickness of the plates tested.

13. In addition to the temper tests required for *every* plate and angle, cold bend tests are to be made from each plate or bar tested for tension ; also from all garboard plates, and all plates where it is known they are to be flanged.

14. In addition to this, samples of plates and bars should be subjected to cold bending tests at the discretion of the Surveyors.

RIVETS.

15. The steel used for rivets to be of special quality, soft and ductile, and samples of the rivets should be tested by being bent both hot and cold, by flattening down the heads, and by occasional forge tests, in order to satisfy the Surveyors of their thorough efficiency.

(*For List of Steel Manufacturers see pages* 117 *to* 119.)

WORKMANSHIP.

Section 4. 1. The workmanship to be well executed, and submitted to the closest inspection, and amended where necessary before coating or painting : it is not, however, intended to prevent the coating of the plates inside in the way of the frames.

2. The black oxide or "millscale" *must* be removed from the surfaces before coating or painting, which should be delayed as long as possible.

3. Experience has also shown that, as regards durability, it is highly desirable to place steel vessels in dry dock within a reasonably short time after being launched, for the purpose of cleaning and re-coating the bottom.

4. Stringer plates, sheerstrakes, garboard strakes, and all buttstraps, when above $\frac{10}{20}$ of an inch in thickness, are to be carefully annealed, or the holes sufficiently rimed after punching, to remove the injurious effect of the punching.

KEEL, STEM, STERN AND PROPELLER POSTS, AND TRANSOMS.

Section 5. 1. The keel, stem, stern, and propeller posts are to be either scarphed or welded together, and to be in size according to Table S 2 ; if scarphed, the length of scarphs to be nine times the thickness given in the Table ; and the rivet-holes required in the *thin* ends of them are to be drilled after the scarphs are fitted.

2. Where the garboard strakes are thicker than required by the Rules, the thickness of the keel may be proportionately reduced.

3. Where the keel and keelsons are made of several thicknesses of plates, their combined thickness to be the same as is required for a solid keel, as per Table S 2 ; and the butts of the several plates of which the keel is formed to be carefully shifted from each other.

4. When **Hollow or Flat Plate Keels** are adopted, their breadth and thickness are to be as given in Table S 2 ; and the strake of plating on each side adjoining the flat plate keel to be of the thickness required for the garboard strakes in the Table. Where the number is 26,000 and above, the flat-plate keel to be doubled for one half the vessel's length amidships.

5. Where flat plate keels are used, intercostal keelson plates, or vertical centre-plates, must be fitted close down on the keel, and connected to it by double angles of the dimensions given for keelson angles in Table S 3, riveted all fore and aft to the keel and keelson. (*See also* Section 9, paragraph 6.)

6. The butt-straps of flat plate keels are to be treble riveted, and as much thicker than the plates they connect as is required for bilge strakes.

7. The stem at its lower part is to be the same moulding as the keel, and attached to it by a scarph of the same length as the keel scarph ; it may be gradually reduced from the height of the load-line to its head, where it may be three-fourths of the sectional area given in Table S 2.

8. The stern and propeller posts, and after end of keel, for single screw propelled vessels, to be of the size given in Table S 2, for stern frames, or of equal sectional area; the portion adjoining the keel to be tapered fair into it. In a sailing vessel, or paddle steamer, the sternpost may be reduced from the lower part of the rudder trunk to its head, where it may be three-fourths of the sectional area given in the Table; and in a steam vessel having a propeller frame, it may be reduced at the head to the size given for stems in Table S 2.

9. The portion of the forging of the stern frame forming part of the keel is to extend sufficiently forward for the after end of its scarph in sailing vessels and paddle steamers to be at least once and a half the frame space before the sternpost, and in screw-propelled vessels at least twice and a half the frame space before the propeller post.

10. The stern-post is to be extended sufficiently above the counter to be connected by two vertical angles of the frame size, to the whole depth of the transom-plate, which is to be fitted close against the stern-post. The transom-plate is to be not less than one and a half times the depth of, and the same thickness as, the midship floor-plates. In screw steamers whose plating number is 20,000 and above, the foremost or propeller post should extend sufficiently above the arch of the propeller-frame to be efficiently connected to plating on the beams, and to a deep transom-plate. (*See* Section 7, paragraph 7.)

11. The rudder braces are to be forged on the stern-post, and spaced from 4 ft. to 5 ft. 6 in.

12. When cast steel stern-frames, rudders, steering quadrants, and tillers are fitted they must be subjected to percussive, hammering, and mechanical tests, in the presence of one of the Society's Surveyors, so as to insure the material being of ductile quality. Sketches of the proposed castings are to be submitted for the approval of the Committee. Where stern-frames are in more than one piece, the length of the scarphs should not be less than three times the width of the stern-posts, and the breadth one and a half times the width of the stern-posts, secured by not less than four rows of rivets.

13. The tests to be as follows :—A tensile test is to be made on a piece taken from each casting, and the extension on a length of 8 inches is not to be less than 8 per cent., and the tensile strength not less than 28 tons, nor more than about 35 tons per square inch. A cold bending test also to be made corresponding to each tensile test, and the sample to bend cold before fracture through an angle of at least 90°.

Large stern-frames cast in one piece to be let fall on a hard flat ground (excavations being made to take the boss part and other projections), after being raised through an angle of 45°. Stern-frames cast in more than one piece, and rudders, to be dropped from a height of from 7 to 10 feet, according to the design, shape, and weight of the casting. The casting in each case to be subsequently slung up and well

hammered with a sledge hammer, not less in weight than 7 lbs., to satisfy the Surveyors that the castings are sound and without flaws existing either originally or developed as the result of the application of the preceding percussive tests.

FRAMES.

Section 6. 1. The frames to be of the dimensions set forth in Table S 1, and to extend from the keel to the gunwale. They are to fit closely to the upper edge of the keel ; and the after frames should be sufficiently apart transversely to admit of sound riveting and workmanship. At the extreme ends of the vessel the lower parts of the frames opposite to each other are to be lapped and riveted together. Where either raised quarter-decks, bridge-houses, poops, or forecastles, are constructed, the frames are to extend to their deck stringers respectively, except when constructed of a rounded form at the gunwale ; they may then terminate at the lower part of the curve.

2. When the frames are butted on the keel they are to have not less than 3 feet lengths of corresponding angle bars, fitted back to back, to cover and support the butts and receive the plating for at least three-fourths the vessel's length amidships. Similar pieces of angle bar are to be fitted if the frames are butted elsewhere.

3. The rivet holes to be punched through from the faying surfaces of the frames, and they are not to be punched at the turn of the bilge until the frames are bent to the required shape ; the holes in the way of the lands of the plating are to be drilled after the plating is wrought.

4. The spacing of the frames from centre to centre to range from 20 to 27 inches, according to the size of the vessel, which spacing should not be exceeded around the stern of the vessel at the knuckle. (*See* Table S 1.)

FLOOR-PLATES.

Section 7. 1. The floor-plates to be in size at the middle line according to Table S 1, excepting in the engine space in steam vessels, where they must be $\frac{1}{20}$ of an inch thicker, and in the boiler space $\frac{2}{20}$ of an inch thicker. Where floor plates are $\frac{9}{20}$ of an inch in thickness and above they may be reduced $\frac{1}{20}$ of an inch for one-tenth the vessel's length before and abaft the three-fifths length amidships, and the remaining floors may be $\frac{2}{20}$ of an inch less in thickness than the midship floors. They are to be moulded not less than one-half their midship depth* at a distance of three-quarters the half breadth of the vessel set out from the middle line on the run of the frame, and not less at their extreme ends than the moulding of the frames ; and they are to extend in a fair curve well up the bilges, in no case terminating lower at the outside of the frame than a perpendicular height of twice the midship depth of the floor above the top of keel. The ends of the floors to maintain the height prescribed for one quarter of the vessel's length amidships, they may then be gradually lowered forward and aft until the upper edges of the floor-plates are level (this place to be determined by the form of the vessel), from which to the ends they are to be gradually increased in depth, so as to efficiently connect the sides ; and in the after peak of steam vessels they are to extend above the stern tube. The upper parts of the floors forward and aft are to be high enough to give ample room between the reversed frames on each side of the vessel for fitting the keelson angle bars. (*See also* Section 26, paragraph 2.)

* In vessels of unusually fine or full form the moulding should be modified to the approval of the Committee.

2. A floor-plate to be fitted and riveted to every frame, and to be extended across the middle line, except where a vertical centre-plate is adopted, in which case the floor-plates are to be efficiently connected to it on each side by double vertical angles of not less size than the reversed frames.

3. When floors are made in two lengths, the butts are to be well fitted, and to have double butt-straps treble riveted ; or, the floor-plates may be lapped and treble riveted.

4. Floor-plates to which the bulkheads are attached must be deeper than the adjacent floor-plates, to admit of the bulkheads being riveted to them above the reversed angle bars.

5. *In the cases of vessels intended to load or discharge while lying aground, it is recommended that the bottoms be additionally strengthened, in order to withstand the exceptional strains to which they may be subjected.*

6. WATERCOURSES are to be formed above the frames through all the floor-plates on each side of the middle line, also at the lower turn of the bilges in vessels of full form, as well as through the vertical centre-plate, and intercostal keelsons, when such keelsons are adopted, so as to allow water to reach the pumps freely.

7. TRANSOM-PLATES are to be fitted and connected to the frames, and to the stern-post, so as to efficiently support the counter. (*See* Section 5, paragraph 10.)

REVERSED ANGLES ON FRAMES.

Section 8. 1. Reversed angles on frames to be in size as per Table S 1.

2. Vessels where the number for regulating the size of the frame is below 45, to have reversed angles riveted to every frame and floor-plate, extending across the middle line to the upper part of the bilges.

3. Vessels where the number as per Rule is 45 and below 57, to have reversed angles riveted to every frame and floor-plate, extending across the middle line to the upper part of the double angle stringer above bilges, and to the gunwale alternately ; or, if the vessel is of a depth to require hold beams, the reversed angles are to extend to the upper part of the hold beam stringer angle and gunwale alternately.

4. All vessels, except those having an awning-deck, where the number as per Rule is 57 and upwards, to have reversed angles on every frame, extending alternately to the upper deck stringer plate, and top of angle bar on stringer plate next below it. In awning-decked vessels they are all to extend to the upper part of the main deck stringer angle bar. (*See* also Section 26, paragraph 4, Section 45, paragraph 2, and footnote on Table S 6.)

5. In sailing vessels where the number as per Rule is 75 and upwards, the reversed frames are to extend to the gunwale on every frame.

6. Double reversed angles to be fitted on every floor, extending from bilge to bilge in the engine and boiler spaces of steam vessels ; and where the vessel is of 17 feet in depth or above from the hold beams, or where the number for plating is 15,000 or above, they are to extend sufficiently high to admit of the stringer at upper part of bilge being connected to them. Short double reversed angles are also to be fitted on all frames in way of the keelsons and stringers in hold, connected by not less than three rivets to the frame.

7. The butts of reversed angles, excepting those at middle line, to be secured with butt straps, having two rivets on each side of the butt.

8. The rivets for securing the reversed angles to the frames and floor-plates to be in diameter in proportion to the greatest thickness of angle, or plate, through which they pass, as specified in Table S 1, and to be spaced seven times their diameter, from centre to centre.

9. In vessels where the plating number is 20,000 and above, reversed angles should be fitted to every frame to the height of the upper, spar, or awning deck, abaft the after peak bulkhead ; and in addition, where such vessels have broad flat counters, a double angle stringer should be fitted midway between the middle, and upper, spar, or awning deck beams for a reasonable length, connected by plate knees to the transom plate ; or other additional strengthening applied, as the Surveyors may deem necessary.

10. In top-gallant forecastles of vessels whose plating number is 18,000 and above, the alternate reversed frames are to extend to the forecastle deck, or a double angle stringer of the size required for reversed frames is to be fitted inside the frames midway between the upper and forecastle decks, connected at the fore end by an efficient breasthook ; or other equally efficient means of strengthening the forecastle may be adopted, if approved by the Committee.

MIDDLE LINE KEELSONS.

MIDDLE LINE SINGLE PLATE KEELSON.

Section 9. 1. The middle line keelson, if of single plate and standing above the floor-plates, to be of the size prescribed in Table S 3, and to have angles of the dimensions given in the same Table fitted and riveted on its upper and lower edges. In addition there is to be a rider plate on the top of the keelson-plate, extending over three-fourths of the length of the vessel amidships, riveted to the angle bars, the breadth of which is to be equal to the sum of the two broad flanges of the keelson angles together with the thickness of the centre plate it covers ; the thickness of the rider-plate not to be less than prescribed in Table S 3. The butts of the plates and angles forming this keelson to be properly shifted, and to be efficiently butt-strapped.

2. The butts of the vertical plate to be secured with double butt-straps, each not less than $\frac{3}{20}$ of an inch thicker than half the thickness of the plates they connect, and to be treble riveted, or the plates may be lapped and treble riveted ; the butt-straps of the rider-plate to be fitted on the upper side, and to be treble riveted ; the butt-straps of the angle bars to be of sufficient length to have not less than three rivets in each flange properly arranged on each side of the butt.

3. Vessels in which the number for plating is 33,000 and above are to have a foundation-plate not less than 18 inches broad and $\frac{10}{20}$ of an inch thick fitted on the top of the floors, under the middle line plate keelson.

MIDDLE LINE INTERCOSTAL KEELSON.

4. If a middle line intercostal keelson be adopted, the plates are to be of the thickness prescribed in Table S 3, and riveted to vertical angles of not less size than the reversed frames, to be fitted and attached to all floor-plates; the intercostal plates to extend from the keel to the top of the floors, and to be fitted close to them. A bulb-plate, at least two inches deeper than required for the main deck beams, is to be let down below the top of the floors, between the reversed angles, sufficiently for the intercostal plates to be riveted thereto, and the bulb to be fitted between, and riveted to, two longitudinal angle

bars on the floors, extending all fore and aft, of the size given for keelson angles in Table S 3; or the letting down of the bulb plate may be dispensed with if the intercostal plates are extended to the upper edge of the longitudinal angles.

5. When intercostal keelsons are adopted with hanging keels, in vessels where the number for plating is 13,000, and under 18,000, instead of a bulb plate there is to be a centre vertical plate let down and attached to the intercostal plates below the top of floors, having double continuous angles at top and bottom, and a rider plate on its upper edge, of the sizes given in Table S 3; the vertical plate and the rider plate are to be of the thickness required for stringer plates in upper line of Table S 5, and the depth above the floors to be sufficient to admit of the angles being properly fitted. When the number is 18,000 and above, the vertical plate and the rider plate are to be of the thickness given in Table S 3 for main keelsons, and the depth of the vertical plate above the floors to be not less than three-fourths of that given in the said Table.

6. Where **Flat plate keels** are adopted, intercostal keelson plates attached to the floor plates, or centre through-plates, must be fitted close down on the keel, and connected to it by double angles of the dimensions given for keelson angles in Table S 3, riveted all fore and aft to the keel and keelson, the spacing of the rivets not to exceed 5 diameters apart. In vessels where the number for plating is 13,000 and under 15,000, or where the length exceeds ten times the depth, instead of a bulb plate, there is to be a centre vertical plate let down and attached to the intercostal plates below the top of floors, or connected to the centre through-plate, having double continuous angles, at top and bottom, and a rider plate on its upper edge; the vertical plate and the rider plate are to be not less in thickness than that given in the upper line of Table S 5 for stringer plates, and the depth above the floors to be sufficient to admit of the angles being properly fitted. Where the number is 15,000 and above, the vertical plate and the rider plate are to be of the thickness given in Table S 3 for main keelsons, and the depth of the vertical plate above the floors to be not less than three-fourths of that given in the said Table. Where the number is 26,000 and above, the flat-plate keel to be doubled for one half the vessel's length amidships.

CENTRE THROUGH-PLATE KEEL AND KEELSON.

7. If the middle line keelson be formed of a centre through-plate, extending from the lower edge of the keel to the top of the floors, it must be $\frac{2}{20}$ of an inch thicker than that required in Table S 3 for intercostal keelsons. To strengthen the floor-plates transversely at their intersection at the middle line, in addition to the double vertical angles riveted to their ends and to the centre plate keelson, there is to be a flat keelson-plate, of the same thickness as, and not less than three-fourths the breadth of, the garboard strakes in Table S 2, riveted to double reversed angles on the upper edge of floors, and to two fore and aft angle bars on the upper edge of the centre through-plate keelson; and where the number for plating is 15,000 and under 18,000, there is to be a bulb plate of the size of the main deck beams, fitted between, and riveted to, two longitudinal angle bars of the size for keelson angles in Table S 3, connected to flat plate keelsons and double reverse bars on top of floors. But, should the centre through-plate keelson be extended above the upper edge of the floors, then it is to be connected by two fore and aft angles of the size given in Table S 3, to two flat plates, one on each side of the middle-line

to be $\frac{2}{20}$ of an inch thicker than that given for intercostal plates, and one-third the breadth of the garboard strakes, to be well riveted to the double reversed angles on the upper edge of the floors. Where the number is 18,000 and above, the centre through-plate keelson is to extend sufficiently high above the floor-plates to take two pairs of double angles of the size given for keelson angles, and there is to be a rider plate fitted on the top, of the thickness of the keelson plate.

8. In all cases the middle line keelson is to be extended as far forward and aft as practicable.

BILGE KEELSONS, AND STRINGERS IN HOLD.

Section 10. 1. All vessels to have bilge keelsons, extending all fore and aft, and placed at the lower turn of the bilges, formed of double angles fitted back to back, of the size given in Table S 3.

2. If the vessel has but a single tier of beams and her number in Table S 3 is under 7,200, a side stringer, formed of the same size angles, is to be fitted about midway between the bilges and upper deck extending all fore and aft.

3. Where the number is 7,200 and above, and the vessel is under $15\frac{1}{2}$ feet depth to top of keel, two double angle stringers are to be fitted on each side between the bilge keelsons and the deck beams, extending all fore and aft, to be riveted back to back and to double reversed angles on the frames ; the size of them not to be less than those used for the middle line keelson.

4. For stringers in hold, see also Section 14.

5. *In the cases of vessels intended to load or discharge while lying aground, it is recommended that the bottoms be additionally strengthened, in order to withstand the exceptional strains to which they may be subjected.*

SIDE KEELSONS.

Section 11. 1. In vessels where the number in Table S 3 is 13,000 and under 15,000, a double angle keelson is to be fitted on each side, as far forward and aft as practicable, and to be placed about midway between the middle line and bilge keelsons.

2. Where the number is 15,000, and upwards, intercostal plates are to be fitted on each side, as far forward and aft between the floors as practicable, and to be placed about midway between the middle line and bilge keelsons ; these plates are to be fitted close to the floors, and to be attached to the outside plating with an angle of not less size than $3 \times 3 \times \frac{7}{20}$; if the plating number is 21,700 and under 30,400, these angle bars to be $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$; and if of 30,400 and above, they are not to be less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$, the intercostal plates are to extend to the top of the floors, and longitudinal plates, in long lengths of the same thickness as the intercostal plates, are to be let down and riveted to them. These plates are to be fitted between, and riveted to, two longitudinal angles of the size given for keelson angles; or the longitudinal plates may be dispensed with if the intercostal plates are extended to the upper edge of the longitudinal angles and riveted to them.

3. Side intercostal plates or side keelsons need not be fitted in the range of double bottoms ; but where partial double bottoms are fitted, these keelsons are to extend into, or scarph the double bottom not less than three spaces of frames, and to be connected to the longitudinal girders where practicable.

4. Vessels not being of a size to require side intercostal keelson plates are to have washplates of the thickness given for bulkheads in Table S 1, fitted between the middle line and bilge keelsons for not less than half the vessel's length amidships.

DETAILS RELATING TO KEELSONS AND STRINGERS.

Section 12. 1. Where bulb plate is used for keelsons or stringers, the joints are to be overlapped and riveted, or otherwise efficiently connected; if overlapped, the length of lap must not be less than twice the depth of the bulb plate; steel of other form than bulb may be used for them if of equal strength.

2. All angle bars for keelsons and stringers are to be in long lengths, properly shifted; and, wherever butted, to be connected with angle or plate, not less than two feet long, fitted in the throat of them, properly riveted to each flange. The thickness of the connecting plates not to be less than the thickness of the angle bars they connect.

3. In all cases the middle line, side, and bilge keelsons, and, where practicable, the stringers, are to be carried fore and aft continuously through the bulkheads, the latter being made watertight around them; and, where such parts of the ship are necessarily separated, the longitudinal strength is to be efficiently maintained, to the satisfaction of the Surveyors.

4. The spacing of the stringers at the ends of vessels, having either single or double bottoms should not exceed the spacing amidships.

5. All keelson and stringer angles may be reduced $\frac{1}{20}$ of an inch in thickness, when above $\frac{7}{20}$ of an inch amidships, for one-fifth the vessel's length at each end.

6. Where keelsons, or other longitudinal strengthening, are required for a certain portion of the length of a vessel care should be taken to lap or properly shift the same, so as to avoid any abrupt termination of strength.

BEAMS.

Section 13. 1. Beams are to be of the form and size given in Table S 4; or they may be composed of any other approved form equal in strength.

2. The beams at the ends of spar and upper deck hatchways, of from six to ten frame spaces in length must be equal in size to those of the main or middle deck; and the beams at the ends of awning deck and long bridge hatchways of similar length are to be of the same size as required for spar deck beams.

3. Strong beams in the machinery space of steamers must, in all cases, have double angles on their upper and lower edges.

4. In **Sailing ships** where the length of the midship hold beam exceeds 39 feet, the hold beams for half length amidships to be one inch more in depth than prescribed in Table S 4, unless they be additionally supported by quarter pillars on alternate beams for the same length. But where the length of midship-hold beam is 43 feet and upwards, both the upper and lower deck beams are to be additionally supported by quarter pillars of the diameter given in Table S 1 for hold and deck pillars at alternate beams, for not less than one-half the vessel's length amidships. When the length of the midship upper deck beams in sailing vessels exceeds 36 feet, the bracket knees to each tier of beams are not to be less than 3 times the depth of the beam, and the depth at the throat to be not less than once and three-quarters the depth of the beam.

5. In steam vessels of 43 feet and under 55 feet in breadth, the beams are to be supported by quarter pillars at alternate beams for three-fourths the vessel's length amidships, in addition to the centre line pillars; and in vessels of 55 feet in breadth and above, the quarter pillars of the diameter given in Table S 1 for hold and deck pillars are to be fitted to every beam. In steamers where the middle deck is fitted exclusively for the accommodation of passengers, quarter pillars need not be fitted in the 'tween decks if the ship is less than 50 feet in breadth.

6. Beams to be well and efficiently riveted to the frames, with bracket ends or knee-plates; each arm of knee-plates not to be less in length than twice and a half, and the depth at the throat not less than once and a half, the depth of beams, and to be in thickness equal to the beams; and not more than 2 holes in each beam arm or frame to be punched before the beam is in place.

7. The round up of the beams of all weather decks should not be less than one quarter of an inch per foot of length of beam. This round up of beam will be assumed in taking the measurement for regulating the scantlings, and arrangement of beams and stringers in hold; and in all cases where a freeboard is assigned by the Committee, this amount of round-up will be assumed as the standard in determining the minimum freeboard which is required for insertion in the Register Book.

8. The beams of the various decks, or of tiers of beams, are to be placed over each other. For variations and reductions in sizes of beams at the ends of vessels see Table S 4, and footnotes.

9. The knees of beam 6 inches in depth to be secured to the frames by not less than four $\frac{3}{4}$ inch rivets. Beams of 7 inches to $8\frac{1}{2}$ inches in depth to have five $\frac{3}{4}$ inch rivets; beams 9 inches to $9\frac{1}{2}$ inches to have five $\frac{7}{8}$ inch rivets; beams 10 inches to $10\frac{1}{2}$ inches to have six $\frac{7}{8}$ inch rivets: and beams 11 inches to 12 inches to have seven $\frac{7}{8}$ inch rivets in the knees.

10. Where beam knees are required to be three times the depth of the beam an additional rivet is to be fitted. (*See* par 4, also Section 14a, par 5, and Section 14b, par 5.)

SPACING OF BEAMS AND STRINGERS IN HOLD.

Section 14. 1. The spacing of beams is to be regulated by the depth amidships, measured from the top of keel to the top of the upper, spar, or awning-deck beams as described in Section 1, paragraph 8, excepting in awning-decked vessels of less than $17\frac{1}{2}$ feet depth to the main deck, in which case the arrangement of stringers in hold, &c., is to be regulated by the depth to the main deck. (*See* also Section 10, paragraphs 2 and 3.)

2. All upper deck beams and the middle deck beams of three-decked ships, and the main deck beams of spar and awning-decked ships, to be fastened to alternate frames, except where steel decks are fitted as provided for in Table S 4.

3. All Vessels under 13 feet in depth are to have a double angle stringer extending all fore and aft about midway between bilge keelson and deck beams, riveted back to back and to double reversed angles on the frames.

4. All Vessels of 13 and under 14 feet in depth to have, in addition to the foregoing, bulb plate of the size required for the deck beams, riveted between the continuous double angle stringer for three-fifths the vessel's length amidships; or the bulb may be dispensed with, provided that, in lieu thereof, intercostal plates in long lengths be fitted between the double angle stringer, and attached by single angle bars to the outside plating.

5. All Vessels of 14 and under $15\frac{1}{2}$ feet in depth to have, instead of the bulb plate, as described above, a plate not less than 12 inches wide and $\frac{7}{20}$ of an inch thick, connected to the outside plating, with double angles fitted on the inner edge of the size of the keelson angles, extending all fore and aft.

6. All Vessels of $15\frac{1}{2}$ feet depth and above to have a double angle stringer of the size given in Table S 3, extending all fore and aft at the upper turn of the bilge on each side.

7. All Vessels of $15\frac{1}{2}$ and under $16\frac{1}{2}$ feet in depth to have hold beams of extra strength, as given in Table S 4, fastened to every tenth frame, with a stringer plate of the size given in Table S 5 for hold beam stringers, attached to the plating and supported by brackets at every alternate frame between the beams, and secured to the beams by efficient gusset plates.

8. All Vessels of $16\frac{1}{2}$ and under $17\frac{1}{2}$ feet in depth to have hold beams of extra strength, as given in Table S 4, fastened to every tenth frame, with a stringer plate on them attached to the side plating of the size given in Table S 5, and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate. On the inner edge of the stringer plate, between the beams, an angle bar is to be fitted, of the size given for keelson angles in Table S 3, with its deep flange vertical, and covering the ends of the bracket plates.

9. All Vessels of $17\frac{1}{2}$ and under $18\frac{1}{2}$ feet in depth to have hold or lower deck beams fastened to every second and fourth frame alternately, or they may have hold beams of extra strength, as given in Table S 4, fastened to every tenth frame, with an angle bar on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case.

10. All Vessels of $18\frac{1}{2}$ and under $19\frac{1}{2}$ feet in depth to have hold or lower deck beams fastened to every second and fourth frame alternately; or they may have hold beams as described in the foregoing paragraph, fastened to every tenth frame, provided double angle bars $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$, be fitted on the inner edge of the stringer plates with a face plate $\frac{7}{20}$ of an inch in thickness, and gusset plates at the beam ends.

SAILING VESSELS.

11. **Sailing Vessels** of $19\frac{1}{2}$ and under 23 feet in depth to have hold or lower deck beams fitted to every alternate frame.

12. Sailing Vessels of 23 and under 24 feet in depth from the upper part of the upper deck beams, or of 16 and under 17 feet from the upper part of the hold or lower deck beams to the top of the keel, to have the lower deck beams fitted to every alternate frame, and to have two double angle stringers extending fore and aft, between the bilge keelson and hold or lower deck beams, on each side.

13. Sailing Vessels of 24 and under 26 feet in depth from the upper part of the upper deck beams, or 17 and under 18 feet from top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and to have in addition to the above, bulb plates of the size of the hold beams fitted and riveted between each of the two side stringers in lower hold on both sides, to extend all fore and aft.

14. Sailing Vessels of 26 and under 27 feet in depth, from the upper part of the upper deck beams, or 18 and under 19 feet in depth, from top of lower deck beams, to have, in addition to the foregoing, intercostal plates of the thickness given in Table S 3, attached to the outside plating, and fitted to the upper stringer, all fore and aft, and to the lower stringer from one-fourth of the vessel's length aft, until it is incorporated with the panting stringer.

15. Sailing Vessels of 27 and under $28\frac{1}{2}$ feet in depth from upper deck, or of 19 and under $20\frac{1}{2}$ feet in depth from top of lower deck beams, are to have the lower deck beams fitted to every alternate frame, and to have orlop stringer plates of the dimensions required for hold beam stringer plates in Table S 5 fitted and attached to the outside plating and reversed frames by angle bars of the size given in Table S 3; these stringers to be supported by bracket-plates riveted to them, and to alternate frames; and upon the inner edge of the stringer-plate an angle bar of the size of keelson angles, as per Table S 3, is to be fitted and riveted, so that its vertical flange may cover the ends of the bracket plates. Or, if preferred, an additional side stringer to those required in the preceding paragraph may be fitted, formed of double angles, bulb, and intercostal plates attached to the outside plating and fitted all fore and aft.

16. Sailing Vessels of $28\frac{1}{2}$ and under $29\frac{1}{2}$ feet in depth from the upper deck, or of $20\frac{1}{2}$ and under $21\frac{1}{2}$ feet from the top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and to have orlop beams of the size given in Table S 4 for "hold beams of extra strength" fitted to every tenth frame, with an angle bar on the inner edge of the stringer plate, as in the preceding paragraph; or these beams may be twelve frame spaces apart, provided double angles $4 \times 3\frac{1}{2} \times \frac{7}{20}$, be fitted on the inner edge of the stringer plate with their deep flange vertical, and with a face plate $\frac{8}{20}$ of an inch in thickness. These beams are to be secured to the stringer plate by efficient gusset plates.

17. Sailing Vessels, when the Plating Number is 24,000 and under 27,000, are to have a bulb plate of the size required by Table S 4 for the lower deck beams fitted to the side keelson for two-thirds the length of the vessel amidships, and intercostal plates are to be fitted to the bilge keelson for half the vessel's length amidships. When the Plating Number is 27,000 and under 30,000, a vertical plate is to be fitted to the side keelson for two-thirds the vessel's length amidships, the plate to be one-half the depth, and the same thickness as that required for the middle line keelson, with double angles and a rider plate on the upper edge. The double angles to be of the size required for upper deck stringer angles, and the rider plate to be of the same thickness as the vertical plate. In addition to this, intercostal plates are to be fitted to the bilge keelson for half-length amidships, with a bulb plate of the size required for lower deck beams for three-fifths the length of the vessel amidships. When the Plating Number is 30,000 and under 33,000, a vertical plate is to be fitted to the side keelson for two-thirds the vessel's length amidships, the plate to be three-fourths the depth of and the same thickness as that required for the middle line keelson, with double angles and a rider plate fitted on the upper edge. The double angles to be of the size required for upper deck stringer angles, and the rider plate to be of the same thickness as the vertical plate. In addition to this, intercostal plates are to be fitted to the bilge keelson for two-thirds the length amidships, with a bulb plate of the size required for lower deck beams for three-fifths the length.

STEAM VESSELS.

18. **Steam Vessels** of $19\frac{1}{2}$ and under 22 feet in depth to have hold beams fastened to every alternate frame; or hold beams of extra strength, as given in Table S 4, may be fitted to every eighth frame, provided an angle bar, of the size given for keelson angles in Table S 3, be fitted on the inner edge of the stringer plate, and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate; or these beams may be spaced wider, not exceeding ten frame spaces, provided double angle bars $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$, and a face plate, $\frac{8}{20}$ of an inch in thickness, be fitted on the inner edge of the stringer plate, with gusset plates as above.

19. STEAM VESSELS of 22 and under 23 feet in depth to have, in addition to the foregoing, an extra side stringer, formed of double angles of the size of the keelson angles, fitted between the hold beams and bilge stringer, extending as far forward and aft as practicable.

20. STEAM VESSELS of 23 and under 24 feet in depth to have, in addition to the above, a bulb plate of the size required for hold beams, fitted between the double angles of each of the side stringers, all fore and aft.

21. STEAM VESSELS of 24 and under 26 feet in depth from the upper part of the upper deck beams, or of 17 and under 18 feet from the upper part of the lower deck beams to the top of the keel, to have the lower deck beams fitted to every alternate frame, and to have hold beams of extra strength, as given in Table S 4, fastened to every tenth frame, with a stringer plate on them attached to the side plating of the size given in Table S 5 for hold beam stringer plates; and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate; and on the inner edge of the stringer plate, between the beams, an angle bar is to be fitted, of the size given for keelson angles in Table S 3, with its deep flange vertical, and covering the ends of the bracket plates.

22. STEAM VESSELS of 26 and under 27 feet in depth from the upper deck, or 18 and under 19 feet from top of the middle deck beams, to have hold beams fastened to every second and fourth frame alternately. Or they may have hold beams of extra strength, as given in Table S 4, fastened to every eighth frame, and to have an angle bar on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case; or they may be spaced wider, not exceeding ten frame spaces, provided double angles $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$ be fitted on the inner edge of the stringer plate, with a face plate on them $\frac{8}{20}$ of an inch in thickness.

23. STEAM VESSELS of 27 and under 28 feet in depth from the upper deck, or 19 and under 20 feet from the top of the middle deck beams, to have hold or lower deck beams fastened to every second and fourth frame alternately. Or they may have hold beams of extra strength as given in Table S 4, fastened to every eighth frame, and to have an angle bar on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case; or these beams may be ten frame spaces apart, provided double angles $4 \times 3\frac{1}{2} \times \frac{7}{20}$ be fitted on the inner edge of stringer plate with their deep flange vertical and with a face plate $\frac{8}{20}$ of an inch in thickness.

24. STEAM VESSELS of 28 and under 30 feet in depth from the upper deck, or 20 feet and under 22 feet from the top of the middle deck beams, to have hold or lower deck beams fastened to every alternate frame. Or if hold beams of extra strength, as given in Table S 4, be fitted, they may be fastened to every eighth frame, provided an angle bar of the size given for keelson angles in Table S 3, be fitted on the inner edge of the stringer plate and gusset plates be fitted as in the previous case; or these beams may be spaced wider, not exceeding ten frame spaces, provided double angles, $4 \times 4 \times \frac{8}{20}$, and a face plate $\frac{9}{20}$ of an inch in thickness be fitted on the inner edge of the stringer plate, with gusset plates at the beam ends.

25. STEAM VESSELS of 30 and under $32\frac{1}{2}$ feet in depth from the upper deck, or 22 and under $24\frac{1}{2}$ feet from the top of the middle deck beams, to have hold or lower deck beams fastened to every alternate frame. Or if hold beams of extra strength, as given in Table S 4, be fitted, they may be fastened to every eighth frame, provided an angle bar of the size given for keelson angles in Table S 3, be fitted on

the inner edge of the stringer plate, and gusset plates be fitted as in the previous case; or these beams may be spaced wider, not exceeding ten frame spaces, provided double angles $4 \times 4 \times \frac{8}{20}$, and a face plate $\frac{9}{20}$ of an inch in thickness, be fitted on the inner edge of the stringer plate, with gusset plates at the beam ends. In either case, in addition, a double angle stringer, of the size given for keelson angles in Table S 3, with bulb plate between, is to be fitted midway between the bilge stringer and the hold beams.

26. Steam Vessels of $32\frac{1}{2}$ and under 36 feet in depth from the top of the upper deck beams to the top of keel, or in which the depth from the top of the lower deck beams is $17\frac{1}{2}$ and under 21 feet, to have the lower deck or hold beams fitted to every alternate frame, and to have below them an orlop stringer plate attached to the outside plating and reverse frames, of the thickness, and three-fourths of the breadth, of the lower deck stringer plates, supported by bracket plates riveted to them and to alternate frames; and upon the inner edge of the stringer plate an angle bar, of the size of keelson angles, as per Table S 3, is to be fitted and riveted, so that its vertical flange may cover the ends of the bracket plates; or a stringer of other form may be fitted, if approved by the Committee.

27. Steam Vessels of 36 and under 39 feet in depth from the top of the upper deck beams to the top of keel, or in which the depth from the top of the lower deck or hold beams is 21 feet or above, are to have the lower deck beams fitted to every alternate frame, and to have orlop beams, of the size given in Table S 4 for "hold beams of extra strength," fitted to every tenth frame, with stringer plates on them, and gusset plates at their ends. The stringer plates to have angle bars on their inner edge, as in preceding paragraph.

28. Gusset plates to be fitted to hold beam stringer plates at all bulkheads where strong hold beams are fitted.

29. Plans of all vessels above 39 feet in depth must be submitted for the consideration of the Committee, with a view to additional strength being provided. And in all vessels where the height between deck stringers at the sides is 8 feet or above, at any part, additional transverse strength at such part must be submitted for approval.

30. When the beams exceed two spaces of frames apart, a knee or bracket plate is to be riveted to alternate frames and to the stringer plate of the thickness required for the frames amidships.

31. Notwithstanding the foregoing arrangements for the spacing of beams, whenever a deck is laid, the beams are not to be further apart than two frame spaces.

32. Where it is necessary, in consequence of long hatchways, engine-rooms, boiler spaces, &c., to dispense with some of the hold or lower deck beams, compensation must be made by fitting hold beams of extra strength, as given in Table S 4, with gusset plates, and angle bars, &c., on the stringer plates, or extra web frames to the satisfaction of the Committee.

33. If an arrangement differing from the foregoing in the spacing of the hold beams, to suit convenience of stowage, be required, a sketch showing beams and stringers of extra strength, web frames, or deep framing, with all particulars, must be submitted through the resident Surveyors, who are to state their opinion thereon, for the Committee's consideration.

34. In way of raised quarter decks, where the depth from the top of the keel to the top of the raised quarter deck beam is 24 feet, or above, and the lower deck hatchways are not framed, a web frame is to be fitted abreast of the hatchway, extending from the floors to the upper deck. Where web frames are fitted in lieu of strong hold beams and the lower deck hatchways are not framed, the web frames in way of the hatchways are to be spaced as required by Section 14a, and extended to the upper deck.

WEB FRAMES IN LIEU OF HOLD BEAMS. (See also Sketches, pages 125 to 128.)

Section 14a. 1. Web frames in conjunction with side stringers in hold will be admitted in lieu of wide spaced hold beams and stringers, if arranged in accordance with the conditions specified below :—

The depth of the vessel for regulating the spacing and depth of web frames, and the number of side stringers required to be fitted, is to be taken from the top of the keel to the top of the first complete tier of beams (other than wide spaced beams), assuming the beams to have the normal round up of one quarter of an inch to the foot of length of beams.

2. When web frames and side stringers are fitted in lieu of hold beams, the web frames and stringers to be of the thickness required for the frames.

3. Double angles are to be riveted on the inner edge of the web frames and stringers; these angles and those connecting the stringers to the web frames and outside plating, also the angles connecting the stringers to the reversed frames, between the web frames, are to be of the same size as the reversed frames. Single angles of equivalent strength may be substituted for the double angles described above provided double angles be fitted in way of the diamond plates described in next paragraph. The web frames to be attached to the margin plate of double bottom by double angles, or to the inner bottom by efficient gusset plates.

4. An efficient diamond plate of the thickness of the web frames is to be fitted at the junction of the web frames and stringers, and to be not less than 24 inches × 18 inches for web frames 14 inches deep; 30 inches × 21 inches for web frames 15 inches deep; and 30 inches × 24 inches when the depth of the web frames exceeds 15 inches.

5. The through beams attached to the head of web frames are to be in all cases of the depth required for "beams of extra strength," excepting where an iron or steel deck is fitted on these beams in which case they may be of the ordinary rule size of beams to alternate frames, provided the knees be three times the depth of the beam. Where web frames are extended to the upper or raised quarter-deck in vessels of 23 feet depth to the top of keel and above, the depth of beam knees to be three times the depth of the beam.

6. When web frames are fitted in way of half beams they are to be connected at the head by large bracket knee plates.

7. The side stringers are to be supported by a bracket knee plate of the thickness required for frames midway between the web frames, when 18 inches in width, except when the web frames are spaced 8 feet apart, when the bracket plates will not be required.

8. On those frames where web frames are not fitted the reversed frames are to extend to the upper deck and the stringer plate next below alternately, except in three-deck and spar-decked vessels where web frames are fitted below the middle deck, in which case the reversed frames are to extend as specified in Section 41, paragraph 5, and Section 42, paragraph 6 respectively.

9. **Vessels of under 16 feet in depth from top of keel,** requiring hold beams, to have web frames 14 inches in depth, eight frame spaces apart, with one side stringer plate above the bilge stringer, fitted intercostally between the web frames, and connected to them by angles and diamond plates as previously described.

10. **Vessels of 16 feet and under 17 feet in depth,** to have web frames 15 inches deep, not more

than eight frame spaces apart, with one side stringer plate above the bilge stringer as described in preceding paragraph.

11. **Vessels of 17 feet and under 18 feet in depth**, to have web frames 15 inches deep not more than eight frame spaces apart with two side stringers, in which case the double angle bilge stringer may be omitted (except in vessels other than Awning deck requiring three tiers of beams, and under 18 feet to the middle or lower deck, when the web frames should be not more than six frame spaces apart).

12. **Vessels of 18 feet and under $21\frac{1}{2}$ feet in depth**, to have web frames 15 inches deep, not more than six frame spaces apart with two side stringers. When of this depth to the middle deck, the web frames are to be 18 inches deep, except in the case of Awning deck vessels where the web frames may be 16 inches deep.

13. **Vessels of $21\frac{1}{2}$ feet and under $22\frac{1}{2}$ feet in depth**, to have web frames 15 inches deep, not more than six frame spaces apart with three side stringers, or web frames with two side stringers 18 inches deep may be substituted, in vessels fitted with a double bottom, provided the brackets outside the margin plate be extended up the bilges to a height of three times the depth of the ordinary rule floor at the middle line. When of this depth to the middle deck, the web frames to be 18 inches deep, with three side stringers, except in the case of Awning deck vessels where the web frames may be 16 inches deep.

14. **Vessels of $22\frac{1}{2}$ feet and under $23\frac{1}{2}$ feet in depth**, to have web frames 16 inches deep, not more than six frame spaces apart with three side stringers. When of this depth to the middle deck, the web frames to be 18 inches deep, except in the case of Awning deck vessels where the web frames may be 16 inches deep.

15. **Vessels of $23\frac{1}{2}$ feet and under 24 feet in depth**, to have web frames 18 inches deep, spaced not more than six frame spaces apart, with three side stringers, as in the preceding paragraph.

Web frames in way of RAISED QUARTER-DECKS, in lieu of lower deck beams and beams of extra strength wide spaced in lower hold.

16. **Vessels of 24 feet and under 25 feet** to the quarter-deck, to have web frames 16 inches deep, five frame spaces apart with three side stringers; and not less than four beams of extra strength, formed of plate and four angles as prescribed in Table S 4 are to be fitted and efficiently connected to one of the side stringers, and to the web frames by large gusset plates and vertical bracket plates, of the thickness of the side stringers. In addition, a water-tight transverse bulkhead to be fitted about midway between the after engine-room bulkhead and the after end of the vessel.

17. **Vessels of 25 feet and under 26 feet**, to have web frames 16 inches deep, from four to five frame spaces apart, with three side stringers, and not less than four beams of extra strength, and an additional water-tight bulkhead as in preceding paragraph.

18. **Vessels of 26 feet and under 27 feet**, to have web frames 18 inches deep, four frames spaces apart, with three side stringers and not less than four strong beams, and an additional bulkhead as above.

19. **Vessels of 27 feet and under 28 feet**, to have web frames 18 inches deep, four frame spaces apart, with four side stringers, and not less than four strong beams, and an additional bulkhead as previously described.

20. In all cases where web frames are fitted in lieu of lower deck and hold beams, as set forth in the foregoing paragraphs, the bulkheads are to be additionally stiffened by a centre vertical web and semi-box beam so as to compensate in an efficient manner for the omission of the support which would be afforded by these decks in case such were fitted.

DEEP FRAMING IN LIEU OF HOLD BEAMS OR WEB FRAMES.

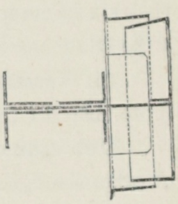
(See also Sketches, pages 129 and 130.)

Section 14b. 1. Where deep framing is adopted in steam vessels, in lieu of a tier of wide spaced hold beams, he depth of the framing should be as required by Table S 1, in vessels having double bottoms, in which the bracket knee plates outside the margin plate are extended up the bilge to a height of not less than two and a half times the depth of the midship ordinary floor. In vessels without double bottoms, the depth of the framing should be increased by one half inch.

2. The angles forming the deep framing to be connected by a single riveted lap, not less than 3 inches in width, and the thickness of the angles and width of the fore and aft flanges should not be less than given in the table for main frames.

3. The inner angles forming reverse frames should extend to the upper deck in two deck vessels, and in other vessels as required by Section 8, provided the height between decks does not exceed 8 feet.

4. The number of side stringers to be regulated by the depth at the middle line to the top of the lowest laid deck; where this depth is under 17 feet, one side stringer and the usual double angle bilge stringer are to be fitted; where the depth is under $21\frac{1}{2}$ feet, two side stringers are to be fitted; and where the depth is $21\frac{1}{2}$ feet and under 24 feet, three side stringers are to be fitted. The width of the side stringers to be as given in Table S 1, and the thickness to be not less than that of the main frames. The stringers are to extend to, and be connected to the outside plating, and to have double angles of the size given in the table on their inner edges and double angles inside the reverse frames. (*See sketch*). Other forms of stringers of equivalent strength may be adopted, provided they are first submitted to the Committee for approval. The continuity of the side stringers is to be maintained at the watertight bulkheads, either by making the plates and angles continuous and fitting bracket plates, or by stopping them and fitting large bracket plates one-twentieth of an inch thicker than the stringer plates, and twice their depth inside the face angles. These brackets should be attached to the bulkheads by double angle collars, and be attached to the side stringers by a double row of rivets on each side of the bulkheads.



5. Where this system of framing is adopted, the beam knees of the lower tier should be three times the depth of the beams. Where the deep framing is extended through the engine and boiler space, the web frames required may be spaced about ten frame spaces apart.

6. In the case of **Three deck and Spar deck vessels,** these Rules are framed for vessels in which the height between decks is from 7 to 8 feet; where these limits are departed from, the cases will be specially considered by the Committee.

7. When deep framing is adopted under **Raised Quarter decks,** the depth of the framing, width of stringers, and size of angles is to be regulated by the frame number obtained by adding the height of the raised quarter deck to the frame number of the vessel to main deck, and the number of stringers to be regulated by the depth at middle line from top of keel to top of raised quarter deck. Strong beams and additional watertight bulkheads to be fitted, as required by Section 14a, when web frames are adopted.

8. When deep framing is adopted in vessels over $32\frac{1}{2}$ feet from top of keel to top of upper deck beams, plans are to be specially submitted for the consideration of the Committee.

PILLARS.

Section 15. 1. All beams the length of which exceeds one half that of the midship upper deck beams to be pillared where practicable. Where pillars are required to the upper deck beams the pillaring must be completed down to the keelson. The pillars to the coamings of hatchways should not exceed 4 frame spaces apart on each side, and all hatchways 26 feet in length and above are to be pillared at the corners ; in addition, the beams under deck houses, bowsprit, pall bitt, windlass, steam winches, and capstan are to be pillared, and wherever else the Surveyors may deem necessary; the pillars to have not less than two rivets in each of their ends, so as to form a continuous tie from the keelson to the upper, spar, or awning deck, and to be of the sizes given in Table S 1. Where a vessel has three decks or tiers of beams, the size of the pillars to the middle tier is to be a mean between the sizes given in Table S 1.

2. In **Sailing Ships** where the length of the midship hold beam exceeds 39 feet, the hold beams for half length amidships to be one inch more in depth than prescribed in Table S 4, unless they be additionally pillared by quarter pillars on alternate beams for the same length. But where the length of midship hold beam is 43 feet and upwards, both the upper and lower deck beams are to be additionally supported by quarter pillars at alternate beams, of the diameter given in Table S 1 for hold and deck pillars, for not less than one-half of the vessel's length amidships.

3. In **Steam Vessels** of 43 feet and under 55 feet in breadth, the beams are to be supported by quarter pillars at alternate beams for three-fourths the vessel's length amidships, in addition to the centre line pillars, and in vessels of 55 feet in breadth and above the quarter pillars of the diameter given in Table S 1 for hold and deck pillars are to be fitted to every beam. In steamers where the middle deck is fitted exclusively for the accommodation of passengers, quarter pillars need not be fitted in the 'tween decks if the vessel is less than 50 feet in breadth.

4. Quarter pillars to be of the diameter given in Table S 1 for hold and deck pillars.

5. All pillars to have solid welded heads and heels.

6. Pillars which extend from the keelson to the upper deck beams in vessels with two decks, or tiers of beams, or with one deck and web frames ; or to the middle deck beams in vessels with three decks, or tiers of beams, or with two decks and web frames ; and the hold pillars in sailing ships of 22 feet depth of hold and above, are to have their diameter increased by $\frac{3}{8}$ of an inch beyond that given in Table S 1. When pillars extend in one length from the floors to the upper deck in vessels requiring three tiers of beams, their diameter is to be increased $\frac{3}{4}$ of an inch beyond that given in Table S 1 for hold pillars.

7. Where double pillars are fitted for the purpose of securing shifting boards, they are not to be less than three-fourths the diameter for single pillars.

8. Where hollow pillars are to be used, they are to be of malleable steel or iron, of the diameter and thickness given in Table S 1, with solid welded heads and heels.

9. If pillars be fitted on a shaft tunnel, the tunnel should be strengthened in way of them, by doubling plates, angle bars, and a transverse vertical plate, or by other efficient means to the satisfaction of the Surveyors, but it is considered preferable that the pillars be fitted clear of the tunnel.

10. The beams in the engine room to be pillared wherever practicable.

11. Where a middle line bulkhead is fitted in lieu of pillars, the thickness is not to be less than

$\frac{5}{16}$ of an inch, connected at the bottom and to plating on the beams by double angles not less than $3 \times 3 \times \frac{7}{16}$, and stiffened vertically by double angles or tee bars of equivalent strength to the pillars required by Table S 1, and paragraph 6 of this section, spaced two frame spaces apart; the stiffeners on one side of the bulkhead to be attached to the beams.

STRINGERS ON BEAMS.

Section 16. 1. All vessels to have stringer plates upon the ends of each tier of beams. Those upon the ends of the upper deck beams of one and two deck vessels, the upper and middle deck beams of three deck vessels, and upon the main deck beams of spar and awning-decked vessels, to be of the breadth and thickness given for main stringer plates in Table S 5, for half the vessel's length amidships; from thence to the ends of the vessels they may be gradually reduced to the dimensions given for the ends of main stringer plates in Table S 5.

2. The stringer plates on ends of the beams next below the upper deck in two deck vessels, and below the middle deck in three deck vessels, and below the main deck in spar or awning-decked vessels to be of the breadth and thickness given for hold beam and lower deck stringers in Table S 5.

3. The stringer plates on the ends of spar-deck beams are to be the breadth of, and may be $\frac{1}{20}$ of an inch less in thickness than, the stringer plates given on the upper line of Table S 5 for vessels of the same plating number, and may be reduced at their ends $\frac{1}{20}$ of an inch in thickness, and to the breadth given for the ends of main deck stringer plates in Table S 5.

4. The stringer plates on the ends of awning-deck beams to be as per Section 43, par. 9.

5. The stringer plates on all tiers of beams are to be fitted home and riveted to the outside plating, all fore and aft, with angle bars of the dimensions required by Table S 3; the middle, lower, and orlop deck stringer plates to have an additional angle bar of the same dimensions extending all fore and aft riveted to the reversed frames and to the stringer plates. (For riveting of butts see Section 20.)

6. In cases where no deck is laid, and the width of the stringer plate on the ends of the hold beams is objected to, it may be reduced, provided such reduction be fully compensated for and receive the sanction of the Committee.

7. When the frames are extended through the upper deck stringer plate to form frames for bridge-houses, or poops and forecastles, there must be a continuous angle bar, of the size given for lower deck stringer angles, wrought on the upper deck stringer plate inside the frames.

8. The main and hold beam stringer plates may be reduced at the ends of the vessel to the sizes given for the same in Table S 5.

9. The upper deck stringer angle bar is in all cases to be fitted on the upper side of the stringer plate.

10. When gutter waterways are fitted to upper decks in vessels having poops or forecastles, the angle bars forming the ends of the gutters are to be welded, and the gutters to be carefully caulked.

TIE-PLATES ON BEAMS.

Section 17. 1. All vessels to have tie-plates ranging all fore and aft upon each side of the hatchways on each tier of beams, these plates to be lapped or butted, and at least double riveted. Upon hold beams, or lower deck beams spaced two to four frame spaces apart, on which no deck is to be laid, or where tie-plates would interfere with stowage of cargo, double angle bars of the dimensions given in Table S 3 for angle bars on lower deck beam stringer plates, placed at middle line or at each side of the hatchways,

extending fore and aft wherever practicable, and well riveted to all beams and stringers, will be admitted in lieu thereof.

2. Diagonal tie plates are to be fitted on the beams of all sailing vessels in way of the masts at the deck on which they are wedged; and in addition, where the plating number is 15,000 and above diagonal tie-plates are to be fitted all fore and aft on the upper deck.

3. Where diagonal tie-plates cross each other, or the fore and aft tie-plates, between the beams, and a deck is to be laid thereon, one set of tie-plates must be set down in way of the crossing, so as to leave one thickness only projecting above the beams.

4. The tie-plates to be of the width and thickness given in Table S 5, for half the vessel's length amidships, tapered at the ends to the same thickness as the ends of the stringer plates. They are to be well riveted to each other and to the beams and stringers; and all butts to be properly shifted.

HOOKS AND CRUTCHES AND PANTING ARRANGEMENTS.

Section 18. 1. All stringers, where practicable, to extend fore and aft, and to be efficiently connected at their ends with plates forming hooks and crutches of the same thickness as the floor-plates amidships, and those below the hold beams should be spaced about 4 feet apart. In vessels whose plating number is 24,000, or above, an additional hook or crutch should be fitted at the ends of the vessel, between each tier of beams, to the satisfaction of the Surveyors.

2. The depth for regulating the number of tiers of beams to alternate frames in the fore peak to be taken at the collision bulkhead, and the beams fitted in accordance with Section 14 for this depth. All vessels to have, in addition, provision made to prevent panting by extra beams, bracket knees and stringer plates being fitted before and abaft the collision bulkhead. Panting beams and stringers to be fitted at the after end where considered necessary by the Surveyors.

3. Sailing vessels under 20 feet in depth at the collision bulkhead, to have lower deck or panting beams fitted to alternate frames in the peak, with a stringer plate two-thirds the breadth of the lower deck stringer plate amidships. Vessels 20 feet and under $30\frac{1}{2}$ feet in depth to have in addition to the lower deck beams, a tier of panting beams with a stringer plate two-thirds the breadth of the lower deck stringer plate amidships. Vessels $30\frac{1}{2}$ feet and under 33 feet in depth to have two tiers of panting beams below the lower deck with stringer plates on their ends.

4. The stringer plates on the panting beams to be attached to the outside plating when fitted in continuation of intercostal stringers. These plates are to extend abaft the collision bulkhead for a length of not less than one-fourth the midship breadth of the vessel, and be efficiently supported by brackets at alternate frames. Panting beams and stringers to be fitted at the after end where considered necessary by the Surveyors.

5. Plans of proposed panting arrangements in vessels of 33 feet in depth and above to be submitted for the consideration of the Committee.

PLATING.*

Section 19. 1. The thickness of the outside plating as given in Table S 2, for half the vessel's

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have the butt-straps double or treble riveted, as may be required by Section 20, and, in addition, these doubling plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges.

length amidships, is to be maintained for that length, but it may thence be gradually reduced to the thickness given for the extreme ends, by gradations of $\frac{1}{20}$ of an inch over equal parts before and abaft the half-length amidships. In all screw steamers the garboard plates connected to the stern frame, and where the plating number is 16,600 or above, also the after lengths of plating so connected, must be of the thickness required for the same strakes amidships. In sailing vessels, the outside or overlapping strakes of plating for one-quarter of the vessel's length at her fore end should only be reduced $\frac{1}{20}$ of an inch from the midship thickness; and where the plating number is 16,000 or above, three strakes of plating at the bilges are to be increased $\frac{1}{20}$ of an inch in thickness throughout, and when the plating number is 22,000 and above, the strake of plating in way of the hold beams is to be increased $\frac{1}{20}$ of an inch in thickness for one-half the vessel's length amidships.

2. In the columns for plating in Table S 2, where two thicknesses are given they are to be worked in alternate strakes, and the greater thickness is to apply to the outer strakes, and the lesser thickness to the inner strakes; and the size of the rivets and double riveting are to be regulated by the thickness of the thicker plating.

3. No plates to be less in length than six spaces of frames, except the fore and after lengths.

4. No butts of outside plating in adjoining strakes to be nearer each other than two spaces of frames; and the butts of the alternate strakes not to be under each other, but shifted not less than one frame space.

5. The butts of the upper or main deck, and of spar deck stringer plates, in all cases to be shifted not less than two spaces of frames clear of the butts of the sheerstrakes.

6. The butts of the garboard strakes to be shifted clear of the keel scarphs, and not to be nearer each other on opposite sides of the vessel than two spaces of frames.

7. All butts of plating, where practicable, to be planed and fitted close; the edges of the plating to be sheared from their faying surfaces, or the burr caused by shearing to be carefully chipped off, and all outside edges of plating are to be either planed or chipped fair. The butts and edges to be carefully caulked.

8. The breadth and thickness of the sheerstrakes and garboard strakes to be as given in Table S 2.

9. The sheerstrakes in one, two, and three decked, and spar-decked vessels to be fitted sufficiently high above the upper deck beam ends, so as to take at least two rows of rivets vertically in the butts above the upper flange of the gunwale angle bar.

10. The boss-plates covering the screw shaft are to be the same thickness as the strakes amidships of which they form part where the number for plating is under 13,900; if that number and under 18,700 the plates are to be $\frac{1}{20}$ of an inch thicker; and if the number is 18,700 and under 26,500, the plates are to be $\frac{1}{20}$ of an inch thicker than the midship plating, and the butts treble riveted; and where the number is 26,500 and above, the boss-plates and the plates above and below the same to be $\frac{2}{20}$ of an inch thicker than the midship plating, and their butts double strapped, or lapped and treble riveted; or the boss plates are to be doubled.

11. When plates forming the outside strakes of plating are above 40 inches but not exceeding 46 inches, or those forming the inside strakes are 48 inches in breadth and not exceeding 54 inches, their butts are to be treble riveted with straps $\frac{1}{20}$ of an inch thicker than the plates they connect. Where the butt-straps of such strakes are required by Section 20 to be treble riveted, the straps required by that

section should be of this increased thickness excepting where the straps are therein required to be $\frac{4}{20}$ of an inch thicker than the plates.

12. Where gutter waterways are adopted at the upper deck, the butt-straps of the bulwark plating are to be sufficiently broad to receive the spur in the middle of the bulwark stay; and when the plates do not exceed 12 feet in length they are to have stays fitted against the butt-straps, and an intermediate stay is to be fitted between the butts on straps or doubling plates. In no case are the stanchions which support the bulwarks to be more than 6 feet apart, and in sailing vessels of 1,800 tons and above, the spacing is not to exceed 4 to 5 feet apart; the heel of each stanchion to be attached by not less than four $\frac{7}{8}$ inch bolts, tapped through the stringer plate, and secured with a nut and grummet. Their size may be from $1\frac{3}{8}$ in. to 2 in. in diameter, regulated by the length of the stanchion and the size of the vessel. Other forms of stanchions may be adopted, provided they be submitted for approval.

BUTT-STRAPS AND LINING PIECES.

Section 20. 1. In vessels whose plating number does not exceed 8,000, the butt-straps of the sheerstrake, deck stringer plate, and one strake at the bilges for half the vessel's length amidships are to be $\frac{1}{20}$ of an inch thicker than the plates they connect, and to be double riveted.

2. When the plating number is above 8,000 and not exceeding 13,000, the butt-straps of the sheerstrake, deck stringer plate, and two strakes round the bilges are to be $\frac{2}{20}$ of an inch thicker than the plates they connect, for half the vessel's length amidships, and treble riveted.

3. When the plating number is over 13,000 and not exceeding 16,000, an additional strake of bilge plating is to be treble riveted at the butts for half the length amidships with straps $\frac{2}{20}$ of an inch thicker than the plates they connect.

4. When the plating number is over 16,000 and not exceeding 20,000, the butts of the sheerstrake, deck stringer plate, three strakes of bilge plating, and the remaining outside strakes of plating are to be treble riveted with straps $\frac{2}{20}$ of an inch thicker than the plates they connect, for half the vessel's length amidships.

5. When the plating number is above 20,000 and not exceeding 24,000, all the butts, including those of the upper and middle deck stringer plates, are to be treble riveted for half the vessel's length amidships with straps $\frac{3}{20}$ of an inch thicker than the plates they connect, with the rivets in the back row spaced 5 to $5\frac{1}{4}$ diameters apart; and the remaining butt-straps to be $\frac{2}{20}$ of an inch thicker than the plates.

6. In addition, in vessels where the plating number is 20,000 and under 28,000, the butts of the upper deck stringer plate are to have double straps for half the vessel's length amidships; the thickness of the straps to be as given in paragraph 14 of this section, or, the butts may be lapped and treble riveted; but where the plating number is 28,000 and above, double butt straps are to be fitted to the stringer plates for half the vessel's length.

7. When the plating number is above 24,000 and not exceeding 28,000, all the butt straps, including those of the upper and middle deck stringer plates, are to be treble riveted for three-fourths the length amidships with the back row of rivets spaced 5 to $5\frac{1}{4}$ diameters apart. The butt-straps for half the length amidships to be $\frac{4}{20}$ of an inch thicker than the plates; and the remaining butt-straps $\frac{2}{20}$ of an inch thicker than the plates.

8. When the plating number is above 28,000, the whole of the butt straps all fore and aft, including those of the upper and middle deck stringer plates, are to be treble riveted with the back row of rivets spaced 5 to $5\frac{1}{4}$ diameters apart, and to be $\frac{4}{20}$ of an inch thicker than the plates they connect for three-fourths the length amidships, and $\frac{2}{20}$ of an inch at the ends. In vessels of this size and exceeding 12 depths in length, double butt-straps to be fitted to the sheerstrake and strake below, or other equivalent strength supplied to the satisfaction of the Committee. (*See* also footnote on Table S 6.)

9. The butt-straps of flat keel plates are to be treble riveted, and as much thicker than the plates they connect as is required for bilge strakes.

10. The rivets in the butt straps of outside plating and the upper and middle deck stringer plates to be spaced not more than $3\frac{1}{2}$ diameters apart from centre to centre, except in the back rows in treble riveted butt-straps, which are to be spaced 5 to $5\frac{1}{4}$ diameters.

11. When plates forming the outside strakes of plating are above 40 inches, but not exceeding 46 inches, or those forming the inside strakes are 48 inches in breadth and not exceeding 54 inches, their butts are to be treble riveted with straps $\frac{1}{20}$ of an inch thicker than the plates they connect. Where the butt-straps of such strakes are required by the preceding paragraphs to be treble riveted, they should be of this increased thickness, excepting where the straps are therein required to be $\frac{4}{20}$ of an inch thicker than the plates.

12. All butt-straps to be of the breadth given in Table S 8, and in no case, where single, to be less in thickness than the plates they connect.

13. Where the butts of plating are overlapped, the width of the laps and the riveting of the same are to be as given in Table S 8. In vessels where the plating number is under 16,000, the lap butts of the outside plating for one-half of the vessel's length amidships are to be treble riveted, and the remaining butts double riveted, and where the plating number is 16,000 and above, the lap butts are to be treble riveted throughout. The treble riveted butts to have three complete rows of rivets.

14. Where double butt straps are fitted to stringer plates, sheerstrakes, and outside plating, the thickness of straps to be as given in the following table.

Thickness of Plating.	Strap which is countersunk for rivets.	Strap on opposite side of Plate.
Inches.	Inches.	Inches.
$\frac{9}{20}$	$\frac{7}{20}$	$\frac{6}{20}$
$\frac{10}{20}$	$\frac{8}{20}$	$\frac{6}{20}$
$\frac{11}{20}$	$\frac{8}{20}$	$\frac{7}{20}$
$\frac{12}{20}$	$\frac{9}{20}$	$\frac{7}{20}$
$\frac{13}{20}$	$\frac{10}{20}$	$\frac{8}{20}$
$\frac{14}{20}$	$\frac{10}{20}$	$\frac{9}{20}$
$\frac{15}{20}$	$\frac{11}{20}$	$\frac{9}{20}$
$\frac{16}{20}$	$\frac{12}{20}$	$\frac{10}{20}$

Lining Pieces.

15. The space between the plating and the frames to have solid filling or lining pieces in one length, closely fitted; to be of the same breadth as the frames, excepting in way of bulkheads, where they are to be fitted as stated in Section 22, paragraph 6.

RIVETING AND RIVETS.* (See also Table S 8.)

Section 21. 1. The landing edges of outside plating when $\frac{7}{20}$ of an inch in thickness and above from the keel to the upper turn of bilge, and of the sheerstrake in all cases; and when $\frac{9}{20}$ of an inch and above from the upper turn of bilge to the gunwale, must be double riveted; below these thicknesses the edges may be single riveted. In all cases the thicker of the two plates or angles is to regulate the size of the rivets and the requirements as to double riveting. When the plating is of a thickness amidships to require the edges to be double riveted, the same is to be continued all fore and aft. The stem, stern-post, keel, butts of outside plating, breasthooks, transoms, stringer and tie-plates on beams, also butts of keelsons, stringers, and all longitudinal ties, to be at least double riveted in all vessels.

2. The butts of outside plating to be chain riveted; also all double and treble riveting, except in the keel, stem, and stern post.

3. In the butts of outside plating, a space equal to twice the diameter of the rivet to be between each row; where treble riveting is adopted, a space equal to twice the diameter of the rivet to be between each row, with half the number of rivets in the back row in vessels whose plating number is 20,000 or under; and when above this number, the rivets in the back row are to be not more than 5 to $5\frac{1}{4}$ diameters from centre to centre.

4. The overlaps of the edges and butts of plating to be of the breadth given in Table S 8.

5. The rivets are not to be nearer to the butts or edges of the plating, butt-straps, or of any angle bars than a space equal to their own diameter; and in edge riveting the space between any two consecutive rows of rivets must not be less than once and a half their diameter.

6. The rivet holes to be regularly and equally spaced and carefully punched from the faying surfaces opposite each other in the adjoining parts, laps, lining pieces, butt-straps, and frames; and countersinking to extend through the whole thickness of the plate or angle bar (*see* sketches on Table). They are to be spaced not more than $3\frac{1}{2}$ diameters of the rivet apart from centre to centre in the butts of the outside plating, upper, spar, and middle deck stringer plates, and not more than from 4 to $4\frac{1}{2}$ diameters apart in the edges of the plating and at other parts, excepting in the keel, stem, and sternpost, where they may be 5 diameters, and through the keelsons, floors, frames, and reversed frames, frames and outside plating and the beam angles, where they may be 7 diameters apart from centre to centre. The rivets in the flanges of the gunwale angle bars to be spaced not more than $4\frac{1}{2}$ diameters apart from centre to centre, and those connecting steel decks and stringer plates to the beams to be spaced from 7 to 8 diameters apart in each flange of the beam, in the butts of deck plating 4 diameters, and in the edges from 4 to $4\frac{1}{2}$ diameters apart.

7. The spacing of the rivets in the double angles of the flat plate keels is not to exceed 5 diameters.

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have the butt-straps double or treble riveted, as may be required by Section 20, and, in addition, these doubling plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges.

8. For arrangements of rivets showing minimum number in each frame space in the edges of plating amidships, *see* Table S 8.

9. There are not to be less than four rivets in each flange of the angle bars between the frames which connect the stringer plates and intercostal plates to the outside plating where the spacing of the frames from centre to centre is 23 inches and above; but where the frames are closer spaced, there are not to be less than three rivets.

10. The rivets are to be of the best quality, and to be in diameter as per Table S 8, and to be increased in size under their heads to fill the rivet holes. When riveted up, the rivets are completely to fill the holes, their heads are to be "laid up," and their points or outer ends are not to be below the surface of the plating. Rudder rivets should be of not less size than required for the upper edge of the garboard-strake amidships, and spaced not more than five diameters from centre to centre. The plates to be countersunk, and the rivets to have full heads and points.

BULKHEADS.

Section 22. 1. Screw Steamers, in addition to the engine-room bulkheads, to have a water-tight bulkhead built at a reasonable distance from each end of the vessel. In steamers 280 feet long and above, an additional bulkhead is to be fitted in the main hold about midway between the collision and engine room bulkheads, and extending to the upper deck in vessels with one, two, or three decks, and to the spar deck in spar-decked vessels, and to the main deck in awning-decked vessels; and in steamers of 330 feet long and above, an additional bulkhead is to be fitted in the after hold extending to the same height.

2. The foremost or collision bulkhead to be fitted at not less than half the midship breadth of vessel abaft the stem at the lower deck, and in all cases to extend from the floor-plates to the upper, spar, or awning deck, and its water-tightness is to be tested by filling the peak with water to the height of the load line.

3. When a bulkhead is not completed at one pair of frames from the floor-plate up to its prescribed height per rule, but is recessed, stepped, or stopped at an intermediate part, the water-tightness is to be completed with collars or chocks forming a "metal to metal" connection, to the exclusion of cement, wood, &c. The bulkheads to be connected to the decks and to double bottom plating by double angles of the size of the reversed frame, and to be extended to the outside plating by a watertight sub-division at or near each bulkhead required by Rule.

4. The engine-room bulkheads to extend from the floor-plates to the upper deck, in vessels with one, two, or three decks; and to the spar deck in spar-decked vessels, and main deck in awning-decked vessels. The aftermost bulkhead will be required to extend to the height of the upper or spar deck, unless a different arrangement of bulkheads be approved by the Committee. This bulkhead is to be made water-tight by a stuffing box where the screw shaft passes through, and its water-tightness is to be tested by the after compartment being filled with water to the height of the load line.

5. In sailing vessels the foremost or collision bulkhead only will be required.

6. All plating of bulkheads to be of the thickness prescribed in Table S 1, fitted between two frames at each side of the vessel and to be strongly riveted to them, and to be connected to the floor plates by a double row of rivets. Doubling plates between frames and outside plating in way of bulkheads, are to extend in one piece from the foreside of the frame afore to the aftside of the frame abaft the bulkhead frames, or they may be of an approved diamond shape, fitted and riveted as shown in sketch. (*See* page 136.)

7. The bulkheads to be supported vertically on one side and horizontally on the other, with angle bars of not less size than required for the main frames. The vertical angles to be not more than 2 feet 6 inches apart, and their lower ends to extend well down over the floor plates; or, where a double bottom is fitted, they are to be connected to the inner bottom plating by plate brackets. The horizontal stiffeners are not to exceed 4 feet apart, below where the bulkhead is supported by a laid deck, and, when of bulb angle, they are to be attached with brackets to the vessel's sides. In all collision bulkheads, and other bulkheads of 40 feet and above in breadth, the horizontal stiffeners are to be of bulb angles, of the size required by Table S 4, for bulb angle beams under a steel or iron deck. All bulkheads of 36 feet and under 45 feet in breadth, to be additionally stiffened by a vertical web at the middle line, extending from the keelson to the hold or lower deck beams. Bulkheads of 45 feet and under 55 feet in breadth, to have two vertical webs, and bulkheads of 55 feet and under 60 feet in breadth to be fitted with three vertical webs.

8. In vessels of a depth to require lower deck, hold, or orlop beams, when the bulkheads are not supported on both sides by a lower or orlop deck, they are to be additionally supported by a semi-box beam of the scantlings required by Table S 4 for such beams; the same to be fitted in way of the hold or orlop stringer plate, or the side stringer midway between the floor plates and the lowest laid deck.

9. All such bulkheads to be caulked and made thoroughly watertight.

10. When a recess extending above the hold beams is formed in the engine room bulkheads the bulkhead is to be efficiently connected from side to side by tie or bridle beams, strongly riveted to the plating and fitted with efficient gusset plates.

DECKS.

WOOD DECKS.

Section 23. 1. The flat of decks, if of wood, to be of good quality, properly seasoned, free from sap and objectionable knots; the thickness and fastenings as per Table S 3.

2. Pine planks for weather decks should not be laid within a period of from four to six months (according to their thickness) after being cut; and where pitch pine is used for weather decks, the breadth of the planks should not exceed 5 inches, and the period of seasoning should not be less than six months.

3. Oregon pine of good quality will be admitted for decks of vessels, provided it be laid with the grain vertical, and the width of planks and period of seasoning be as required for pitch pine.

4. The above required periods of seasoning will not be necessary in cases where satisfactory artificial means of seasoning are adopted.

5. The Surveyors must ascertain that the requirement as to the seasoning has been complied with, and special attention should also be directed to the laying of the decks and to the caulking of the seams and rents.

6. When gutter waterways are adopted at the upper deck, the angle bar forming the inner edge of waterways is not to be less in thickness than

$\frac{10}{20}$ where the thickness of the deck is 4 inches
$\frac{9}{20}$ " " " " $3\frac{1}{2}$ inches
$\frac{8}{20}$ " " " " 3 inches

7. In all cases the margin or boundary planks of weather decks to be either Teak or Greenheart.

8. If the deck is of teak, the thickness to be as prescribed in Table S 3.

9. When the deck planks are 6 inches in width or under, single fastening will be sufficient; but when they are above 6 inches and not exceeding 8 inches n width, there must be two bolts in each plank in every beam, one of which may be a short screw bolt; and planks exceeding 8 inches in width must be double fastened with nut and screw bolts.

10. The upper deck to be fastened by galvanised screw bolts with nuts at the under side of the angle bar of the beams and tie-plates. The bolts must be properly sunk, with oakum and white lead, under their heads, and be carefully covered over with turned dowels bedded in white lead, marine glue or some suitable composition.

11. Where diagonal plates are fitted on the beams, the deck planks to be scored over the diagonal plates, so as to fit close on the beams, thereby avoiding the use of wood pads.

12. When a deck originally required to be 4 inches thick is worn to 3 inches, $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches, 3 inches to $2\frac{1}{2}$ inches, it must be renewed, unless it be found on survey to be in good condition, when on application the case will receive the consideration of the Committee.

STEEL DECKS. (See also Table S 5.)

13. Where steel decks are fitted $\frac{7}{20}$ of an inch in thickness and under, and no wood deck is laid on the same, beams of angle bar, or angle bulbs, of the sizes given in Table S 4, are to be fitted to every frame, except at the ends of the hatchways, where they are to be of bulb plate of the size required by the Rules for vessels of the same breadth having no steel deck. Where these angle bars or angle bulbs are fitted to every frame, a stringer is to be fitted at the middle line of the vessel to the under side of the beams formed of double angles of the reverse frame size or tee bars of equivalent section connected by short angle lugs to the under side of the beams, to admit of the pillars being riveted to the same. This stringer is to be connected by angle lugs to all deep beams and bulkheads which it abuts against. Or any other approved web may be fitted.

14. Where steel decks exceed $\frac{7}{20}$ of an inch in thickness bulb beams may be fitted to alternate frames in the usual manner, but steel angle or angle bulb beams to every frame, except at the ends of hatchways, are considered preferable. Where no wooden deck is to be laid on a steel deck, steel angle or angle bulb half-beams, of the size given in Table S 4, are to be fitted to every frame in the way of all hatchways, including those of engine and boiler openings.

15. When the deck plating is $\frac{7}{20}$ to $\frac{9}{20}$ of an inch in thickness amidships it may be reduced $\frac{1}{20}$ of an inch before and abaft the midship half length. When $\frac{10}{20}$ of an inch thick amidships it may be reduced $\frac{1}{20}$ of an inch for one-eighth the length before and abaft the half length amidships, and the remaining plates $\frac{2}{20}$ of an inch from the midship thickness.

16. Where a steel deck is required to be fitted by the rules, and is severed at the break, its continuity of strength is to be maintained by efficient brackets securely attached to the break bulkhead and to the deck plating before and abaft the same, or otherwise arranged to the satisfaction of the Surveyors.

17. If a wood flat be laid over an iron or steel upper deck, the thickness should not be less than 3 inches if of pine and $2\frac{1}{2}$ inches if of teak, and it should be efficiently secured between the beams to the deck plating. Steel or iron decks are not to be reduced in thickness from that given by Table S 5, when sheathed with wood.

18. All upper or weather decks of steel or iron are required to be caulked.

19. The butts of the steel deck to be double riveted for half the length amidships; and where large openings are cut in deck plating compensation is to be given for the same.

20. Where steel or iron decks are fitted, as required by the Rules, additional strength is to be applied in way of all hatchways, either by increasing the thickness of, or doubling the plating, or by fitting plates of the breadth and thickness required for tie-plates in Table S 5.

21. If a wood flat be laid over a steel or iron middle deck it may be $2\frac{1}{2}$ inches in thickness.

22. Where a vessel has a steel deck for half her length amidships, or beyond, but not a complete steel deck, or where there are one, two, or three steel decks; or one, two, or three steel decks, and in addition a partial steel deck, as before described, the same will be inserted in the Register Book thus—pt steel dk; 1 steel dk; 1 steel & pt steel dk; 2 steel dks; &c., &c., as the case may be.

23. Iron decks will be admitted in lieu of steel decks provided the thickness of the plating be in as many sixteenths of an inch as Table S 5 requires in twentieths for steel decks, when a notification of the same will be made in the Register Book, such as 1 iron deck, &c., as the case may be.

24. All upper and weather decks of new vessels, of whatever material they are constructed, are when complete to have their watertightness tested by a hose in the presence of the Surveyors, who are to state in their First Entry Report the results of such tests.

25. All gutterways of new vessels are to be tested by being flooded with water where possible to ensure watertightness, and the Surveyors are to state in their First Entry Report the results of such tests.

DOUBLE BOTTOMS.

Section 24. 1. Vessels fitted with a double bottom, for the purpose of water ballast, extending throughout the whole or part of the length of the vessel, will have the same denoted in the Register Book, together with its length and capacity. (*See* Key to Register Book.)

2. Side intercostal plates or side keelsons need not be fitted in the range of double bottoms; but where partial double bottoms are fitted, these keelsons are to extend into or scarph the double bottom not less than three spaces of frames, and be connected to the longitudinal girders where practicable.

3. Manholes, with wrought iron or steel covers, must be constructed, or provision made for the removal of a portion of the plates so as to enable the inner surface of outside plating, the frames, floors keelsons, and rivets to be thoroughly examined and coated when required, and in way of the manholes in the inner bottom plating, doubling plates or rims should be fitted to receive the fastening of the covers. The double bottom to be made water-tight, and all water-tight joints to be tested on completion with a head of water at least equal to the extreme draught of water of the vessel.

4. Where deep water ballast tanks are fitted their water-tightness is to be tested by a head of water not less than 8 feet above the crown of the tank.

5. A wash plate to be fitted in the peaks when used for water ballast, and the tank to be subjected to the test of a head of water of 8 feet above the crown, but not less in any case than the height of the load water line.

6. All water-tight joints to have the surfaces of steel fitted close to each other and caulked, without, as far as practicable, the use of felt, canvas, &c.

7. The upper side of the plating must be protected with wood ceiling $2\frac{1}{2}$ inches thick, and laid on battens $1\frac{1}{2}$ inches thick, to admit of drainage water passing to the wells, unless the ceiling be laid on the top of the inner bottom, embedded in a substantial covering such as Stockholm tar and cement.

8. Where a double bottom extends through the engine and boiler space, a well should be formed between the engine-room after bulkhead and the floor immediately before the same, for the drainage of water, or open gutter ways of sufficient size should be made in the wings, so as to be always accessible.

9. The ceiling on double bottoms to be removed when the tanks are required by the rules to be tested.

10. It is of importance that ample provision should be made for the free passage of air from one division to another, so that it may readily find its way to the air pipes. This should be done by fitting the liners short, setting down the angle bar from the inner bottom or top of deep tank wherever necessary, and leaving, otherwise, a sufficient number of holes as near to the inner bottom as practicable. The air pipes should also be sufficient in number and size; and, wherever necessary, one should be fitted at each end of each tank on both sides of the vessel.

11. No class will be assigned to vessels having a double bottom, or part double bottom, unless such double bottom, or part double bottom, be constructed in accordance with the requirements of the Rules, or of strength equal to that prescribed thereby.

12. For record of double bottoms, &c., in the Register Book, *see* Key to the Register Book.

Double Bottoms formed with Girders on top of Ordinary Floors.

13. Where double bottoms are fitted with longitudinal girders extending on top of ordinary floors, the inner bottom must be efficiently constructed and made water-tight; the plating of it not to be less in thickness than given in Table S 7, and the girders spaced not more than 3 feet. The double bottom to be efficiently connected to the outside plating and frames of the main body of the vessel; and when reversed frames are cut, they must be compensated for by doubling the frames with short angle bars of their own size. The butts of the flange-plate to be double riveted; the butts and edges of the

remaining plates may be single riveted. The brackets outside the margin plate to be fitted to every frame and extend up the bilges to at least the same height as required for ordinary floors.

14. Where double bottoms are fitted in the fore and after holds and not extended through the engine-room, great care should be taken to provide against an abrupt termination in the longitudinal girders; they are either to be carried through the engine-room, or fully compensated for by connection with the longitudinal engine and boiler bearers, or otherwise, to the satisfaction of the Surveyor. The longitudinal girders to have a continuous angle on the upper and lower edges, and, in addition, to be connected by angle lugs on the floors and girders.

15. Where double bottoms, or part double bottoms, are fitted with longitudinal girders on the floors, all the outside plating (except the garboard strakes) which is entirely within the boundary of them may be $\frac{1}{20}$ of an inch less in thickness than that prescribed in Table S 2, provided that thickness be $\frac{11}{20}$ of an inch, or above.

16. The height of the tank top above the floors to be sufficient for easy access and examination of the inside of tank.

Cellular Double Bottoms.

17. The scantlings, &c., of the various parts of the double bottom are to be as given in Table S 7.

18. In vessels whose plating number is 11,000 and under, triangular bracket plates of the thickness given in Table S 7 may be fitted at alternate frames; but under the engines, solid floor plates of the same thickness, lightened by manholes, and with double angle bars on the upper edge, are to be fitted at every frame and at alternate frames under the boilers. Where the plating number exceeds 11,000 instead of bracket plates, solid floor plates, lightened by manholes, are to be fitted throughout the whole length of the double bottom. In all vessels where flat plate keels are adopted, and in vessels having hanging keels whose plating number is 18,000 and above, bracket plates are to be fitted to the centre girder at the intermediate frames, and where the plating number is 38,000 and under 51,000 the brackets at the centre girder and margin plate are to be of sufficient breadth at the top, to take three rivets in the vertical flange of the intermediate reversed angles, for $\frac{3}{5}$ the vessel's length amidships. Bracket plates inside and outside the double bottom are to be fitted and riveted to the margin plate to every frame all fore and aft, the outside brackets to extend up the bilges to the height required for ordinary floors. The floor plates are to be connected to the centre keelson by double vertical angles, of the size given in Table S 7, in the engine and boiler space in all vessels, and for half length amidships where the plating number is 24,000 and above. Where the plating number is 30,000 and above, the bracket plates outside the margin plate are to be connected to it by double angles, for one-half the vessel's length amidships.

19. The vertical flange of the frame angles which are attached to the solid floors may be of the same size as the horizontal flange.

20. Intermediate angle bars are to be fitted for stiffening the inner bottom plating, unless the longitudinal girders are more closely spaced than given in Table S 7, and solid floors are fitted to alternate frames, when they may be dispensed with.

21. The keel should be formed by the vertical centre plate being extended down and riveted between two side bars, the three thicknesses to equal the thickness required for bar keels, or as otherwise approved.

22. The inner bottom plating to be continuous and wrought longitudinally. The butts to be shifted well clear of each other and of the butts of the longitudinal girders, and the edges to be shifted well clear of the latter.

23. The butts and edges of the middle line strake all fore and aft, and also the butts of the inner bottom plating in the engine and boiler space, are in all cases to be double riveted. Where the plating number is 20,000 and under 30,000 the butts of the inner bottom plating are to be double riveted for half the vessel's length amidships. Where the plating number is 30,000 and under 38,000 the butts of the inner bottom plating, and the edges of an additional strake on each side of the middle line, are to be double riveted throughout. Where the plating number is 38,000 and under 51,000 the remaining edges of the inner bottom plating are to be double riveted for one-half the vessel's length amidships.

24. The butts of the side girders and margin plates are to be double riveted; and in vessels whose plating number is under 21,000 the butts of the centre girder are to be connected by double butt-straps double riveted. When the plating number exceeds 21,000 the butts are to be treble riveted, with the alternate rivets in the back row omitted. The double butt-straps in all cases to be each not less than $\frac{3}{20}$ of an inch thicker than half the thickness of the plates they connect.

25. The rivets in the butts and edges of the inner bottom plating and in the butts of the girders are to be spaced not more than 4 diameters apart.

26. Manholes are not to be cut in the centre girder. The manholes in the floor plates, side girders, and inner bottom plating, are to be no larger and not more numerous than necessary to render all parts of the double bottom readily accessible. The edges of the manholes should be smooth to enable them to be entered with facility.

27. The bulkheads are to be connected to the inner bottom plating by double angle bars of the size required for the reversed frames, and to be caulked and made water-tight.

28. In this system of construction no reduction of thickness in the plating from the requirements of Table S 2 will be allowed where the floors are not spaced to every frame.

Cellular Double Bottoms having Continuous Floors from Centre Girder to Margin Plates.

29. When double bottoms are constructed with solid floor plates, lightened with manholes, fitted to every frame, and continuous in one length from the middle line to the margin plate, the floor plates are to be connected to the centre keelson by double vertical angles of the size given in Table S 7 for half the length amidships where the plating number is 24,000 and above. Double vertical angles to be fitted in the engine and boiler space in all vessels. The scantlings are to be as given in Table S 7, and intercostal plates are to be fitted about midway between the centre girder and margin plate, and well connected to the floors and to the inner and outer bottom plating. Where the plating number is 30,000 and above, the bracket plates outside the margin plate are to be connected to it by double angles, for one-half the vessel's length amidships. In way of the engines additional intercostal girders are to be fitted, the number of girders to be as required by Table S 7.

30. In vessels where the breadth from margin plate to margin plate at inner bottom is 34 feet and does not exceed 44 feet, two intercostal side girders will be required.

31. In this system of construction the outside plating (except the garboard strakes and flat keel plates), which is entirely within the boundary of the double bottom, may be reduced as hitherto admitted in double bottoms with ordinary floors.

32. Any other plan of fitting double bottoms may be adopted, provided in the first instance it receives the approval of the Committee.

CEILING.

Section 25. 1. All vessels to be closely ceiled from the main keelson to the upper part of the bilges, the ceiling to be secured in such a manner as to be easily removed. From the upper part of the bilges upwards, either batten and space or close ceiling may be adopted, but the former is considered preferable.

2. The ceiling on the floors should be made in hatches where practicable, of convenient sizes, and when not so arranged, to be fastened to the reversed angle bars or frames in such a manner as to be removed when required for the purpose of survey, or for cleaning and painting.

3. For thickness of ceiling, *see* Table S 3.

4. Vessels engaged *exclusively* in the coal trade will not be required to have cargo battens fitted.

ENGINE SPACE.

Section 26. 1. In steam vessels care must be taken that the engine and boiler bearers are properly constructed, having efficient longitudinal ties; and where the bearers may interfere with the longitudinal strength of the vessel, they must extend a sufficient distance beyond the bulkheads of the engine and boiler space to compensate for such interruption.

2. Where it is intended to fit engines of greater power than in ordinary cargo carrying steamers, the engine seating should be of proportionately greater strength, and be specially adapted with this object in view by being connected to the sides of the vessel; and other means adopted to ensure greater rigidity and strength to withstand the extra vibration produced in this part of the vessel. The after floor-plates should also be extended well above the screw-shaft, and the after lengths of outside plating attached to the stern-frame should be of not less thickness than the plates in the same range amidships. Great care should be bestowed in ensuring sound riveting and workmanship at this part; the after frames should be sufficiently apart transversely to admit of this being affected.

3. As many *upper*, *middle*, and hold or lower-deck beams of extra strength, having double angles at upper and lower edges of the sizes as per Table S 4, are to be introduced in the engine and boiler space as may be practicable. (*See* Section 14, paragraph 32.)

4. In the engine and boiler space, double reversed angles must be fitted to every floor, from bilge to bilge, and from margin plate to margin plate in vessels having double bottoms; and in vessels where the number for plating is 15,000 and above (excepting in way of double bottoms), or the depth from the top of keel to top of hold beams is 17 feet or above, they are to extend sufficiently high to admit of the bilge stringer angles being riveted to them, unless the bilges are otherwise additionally strengthened by web-frames, beyond the requirements of the rules. Where the number is 16,000 and under 18,000, not less than three web-frames are to be fitted on each side, formed of plates of not less than the thickness of the frames, and of the breadth specified in Section 14a, and to scarph the ends of the floors, and extend to the upper or spar deck. Where the number is 18,000 and under 30,000 these web-frames are not to be

more than from 8 to 10 feet apart, and where the number is 30,000 and above they are not to exceed 8 feet apart. The web-frames are to be fitted in way of the deck beams when practicable, and if fitted between the beams they are to be connected to the stringer plate by bracket knees above and below the same.

5. Where continuous bilge or side stringer bars pass through the web frames efficient compensation to be introduced in way of the same.

6. When hold-beams are omitted in the engine and boiler space the web-frames are to be closer spaced than above described.

7. Where it is desired to adopt other plans than the foregoing for maintaining the necessary rigidity in the engine and boiler space, sketches of the same must be submitted for the approval of the Committee.

SHAFT TUNNEL.

8. The plating of shaft tunnels to be of the thickness required in Table S 1 for the lower half of bulkhead plating: the top plating in way of the hatchways to be not less than $\frac{2}{20}$ of an inch thicker than the remaining plates, or to be covered with wood not less than two inches thick. The tunnel to be additionally strengthened with transverse angle bars not more than 4 feet apart, and 3 feet in way of the hatchways, of the size of the reversed frames, and the plating to be caulked, and the tunnel to be tested with water to ensure its being water-tight. The recess bulkhead and the top plating to be strengthened and supported by similar angles, but spaced the same as the vessel's frames: the top plating where attached to the sides of the vessel to be made water-tight with steel or iron collars or chocks, to the exclusion of wood or cement. The tunnel to be fitted with a water-tight sluice door on the engine-room bulkhead, capable of being closed from the upper deck.

COCKS, VALVES, AND SOIL PIPES. (See also Section 38.)

Section 27. 1. No sluice valve or cock is to be fitted to the collision bulkhead.

2. No sluice valves or cocks are to be fitted to the engine room, or other watertight bulkheads, unless they are arranged so as to be at all times accessible.

3. If the after peak is used as a ballast tank, no sluice valve or cock is to be fitted to the after bulkhead; but if it is not so used, and if no pump is fitted in it, a sluice valve or cock is to be fitted to the after bulkhead, to allow water to reach the pumps when required.

4. When sluice valves are fitted, they are to be so arranged as to be controlled above the Load Water Line, and the rods are to be boxed in to prevent injury.

5. All head and stern pumps to be efficiently provided with stop-cocks to the satisfaction of the Surveyors.

6. Where soil pipes are attached to the outside plating below the load water-line, the lower length must be of steel or iron of substantial thickness, and be secured to the plating with a proper faced joint, and extended for some distance above the load water-line.

7. If the remainder of the pipe be of lead, care must be taken that it be of substantial thickness, and that it be properly protected externally with either zinc or iron, to the satisfaction of the Society's Surveyors.

HATCHWAYS AND MAST PARTNERS.

Section 28. 1. All hatchways are to be properly framed to receive half-beams where required, and the mast-holes to have partners at the upper deck and at the tier of beams where the masts are wedged, the plating of which is not to be less in thickness in any case than is required for stringer plates amidships, excepting in steamers where steel or iron decks are fitted, and the united breadths of the plates are not to be less than twice the diameter of the masts. At the decks where the masts are to be wedged, an angle bar, having the vertical flange not less than one inch deeper than required for the main frame of the ship, is to be fitted and riveted round the plate to the mast-holes.

2. A large angle bar is to be fitted on the beams where coamings are to be fitted, of sufficient size to compensate for double angles, the angle bar to be on the side of the beam that will be clear of the hatchway space. Plates are to be fitted and riveted to these beams, where necessary, in order that the ends of the deck may be properly fastened; and the coaming plates at sides of hatchways are to be connected to plates of the thickness required for tie-plates.

3. Where upper deck hatchways are 12 feet and not exceeding 16 feet in length, strong shifting beams are to be fitted, with proper means for firmly securing the same. Where the length is above 16 feet and not exceeding 20 feet, a deep web-plate is to be fitted between double angles, at the middle of the length, extending the depth of the coamings and carlings; and the fore and aft tie-plates in way of the same, and extending two spaces of beams beyond each end of the hatchway or opening, are to be double the width of that given in Table S 5, or such other arrangement as may be considered equal thereto may be adopted if approved by the Committee. When the length exceeds 20 feet a deck plan is to be submitted for the approval of the Committee, showing the necessary additional transverse strength proposed to be applied, by increasing the number of web-plates, and either increasing the width of the stringer and tie-plates or by plating the beams in way of the same, as the case may require. Where steel or iron decks are fitted as required by the Rules, additional strength is to be applied in way of all hatchways either by increasing the thickness of, or doubling the plating, or by fitting plates of the breadth and thickness required for tie-plates in Table S 5.

4. All hatchway coamings on weather decks and the companions at the fore-end of steamers to be of steel or iron.

5. In all cases where half-beams are fitted, fore and aft carlings of the same size and description as the hatchway beams, are to be fitted in the hatchway spaces; the plates forming the coamings and head ledges are to be of sufficient strength in proportion to their size, and are to extend to the lower edge of the beams and carlings, and must be riveted to them, excepting that when the beams are of bulb plate they may then terminate on the bulb; where coaming plates are of extra thickness the carlings may be dispensed with. (*See* sketches on page 132.)

6. Half beams are to be fitted to alternate frames where a wood deck is fitted, and to every frame under a steel or iron deck, between the hatchway beams, and their ends to be efficiently secured to the fore and aft carlings or coamings. In addition, fore and aft tie-plates are to be fitted close to the coamings and riveted to the beams and half-beams. An angle bar with its flange of sufficient depth to extend half an inch above the deck is to be fitted and riveted to the coamings and head ledge plates, and to the beams

and tie-plates; its upper edge to be properly caulked, and the rivets used in its vertical flange to be countersunk and flush-headed.

7. In vessels having long hatchways for the purpose of "self trimming," wing boards are to be fitted to the approval of the Committee, to prevent the shifting of cargo.

8. The hatches of sailing vessels of 500 tons and above, and of all steamers, to be solid, not less than $2\frac{1}{2}$ to 3 inches in thickness.

ENGINE AND BOILER OPENINGS.

Section 29. 1. The engine and boiler openings of the weather deck of steam vessels are to be properly framed for a height of not less than 18 inches above the deck, the coaming plates to extend to the lower edge of the beams, and iron or steel trunk bulkheads connected to the coamings should be fitted to a height of about 7 feet above the deck; except in Awning and Partial Awning deck vessels where the height of the casing need not exceed 4 feet 6 inches above the deck, provided suitable iron covers be fitted, and the openings have coamings on the top of the casings not less than 9 inches in height; the thickness of the same, where exposed, to be not less than that required for the side plating of poops, and to be efficiently stiffened by vertical angles of the size of the reversed frames 30 inches apart, connected to the coaming plates. The thickness of the coamings to be $\frac{1}{16}$ of an inch more than required for the trunk bulkheads. Where the trunk bulkheads are enclosed by a complete bridge-house extending to the sides of the vessel, and efficiently protected from the force of the sea, a reduction from the above thickness might be admitted, provided in such cases a plan showing the proposed arrangement be furnished for approval. (*See* sketches on page 133.)

2. The engine and boiler openings in the 'tween decks of all vessels are also to be enclosed by trunk bulkheads efficiently stiffened by angle bars 30 inches apart, and extending to the weather deck beams, to which they are to be secured.

3. Strong iron doors will be allowed in these trunk bulkheads, provided their lower parts are at least 18 inches above the deck, and efficient arrangements made for their security.

4. When a poop, or bridge-house, covers the engine and boiler space, the coamings of the engine and boiler openings should not be less than 2 feet above such deck, unless these openings are constructed as provided for in the first paragraph of this section.

5. It is considered that in all cases the engine and boiler openings should be made as small as practicable, and be subdivided by athwartship iron divisional casings to secure the maximum safety of the vessel. The two sides of the casing should in all instances be efficiently connected by angle beams within them at the upper part.

6. The engine-room skylights are to be in all cases substantially constructed and to be securely bolted or riveted to the coamings, and where the skylight top is not solid with bull's eyes fitted in the same, efficient deadlights of metal or wood must be provided. The grating openings over the stokehold must also be protected by plates, fitted with hinges, or otherwise in a manner satisfactory to the Surveyors.

7. Where either of the openings exceeds 15 feet, or the combined length exceeds 30 feet, the beams in way of the same are to be plated over from the stringer to the tie-plates, the plating extending

two beam spaces beyond the openings, and tapered from thence towards the stringer plate for a distance not less than the breadth of the plating required to be fitted; the thickness of this plating to be the same as given in Table S 5 for steel decks.

8. Where large openings are adjacent to each other, the intervening space between the hatchways to be plated over.

COAL BUNKER PIPES AND LIDS.

Section 30. Coal bunker pipes, where practicable, are to be formed so as to be at least twelve inches above the upper deck, fitted with lids having studs to fit in openings made in the pipes, for their security; the pipes to be so formed that tarpaulin may be securely lashed over them. Where there are coal bunker hatches in the weather deck they must be properly framed with coaming plates of suitable height having solid hatches secured by an iron bar or other approved fastening.

PORTS AND SCUPPERS.

Section 31. 1. All vessels must be fitted with a sufficient number of ports and scuppers, to readily discharge any large quantity of water from the upper deck. The ports and flaps, where such are adopted, are to be hung by strong hinges with yellow metal pins, and the scuppers formed in the vertical flange of the upper deck stringer angle bar, which is to be increased in depth so as to enclose the scuppers; or any other equally efficient plan may be adopted.

2. Where the bulwark plating and main rail are cut through to form a cargo port, the bulwark stays at each end of the port should be of increased strength, to the satisfaction of the Surveyors.

3. A sufficient number of scuppers, with proper pipes attached to them, are to be fitted in all 'tween decks to convey water or leakage to the bilges.

4. In Well deck vessels, the freeing port area in the "Well" should be in accordance with the following Table:—

Length of Bulwarks in "Well," in feet.	Freeing Port Area on each side, in square feet.
30	9·5
35	10·0
40	10·5
45	11·0
50	11·5
55	12·0
60	12·5

65 and above, one square foot to each 5-ft. length of bulwarks.

VENTILATORS.

Section 32. It is recommended that ventilators, sufficient in number and size, be efficiently fitted to the upper deck of all vessels.

2. When scuttles are fitted for ventilation in the topsides of vessels, strong covers for them are to be provided; these covers to be efficiently fitted, to the approval of the Surveyors.

3. Where scuttles are fitted in the sheerstrake within three-fifths of the vessel's length amidships, compensation is to be given either by an extra thickness in the sheerstrake, doubling plate in way of the scuttles, or else by the introduction of strong angle bars over them.

CHAIN PLATES.

Section 33. The chain plates to be in proportion to the size of the vessel, and riveted efficiently to the outside plating (not bulwark plating), the sheerstrake being preferable.

BITTS.

Section 34. All bitts, when not of steel or iron, and which do not go down to the deck below, to be fitted into proper sockets fastened through the deck to plates riveted to the beams.

CEMENT.

Section 35. 1. The frames and plating of the bottom of all vessels to the upper parts of the bilges to be thickly and efficiently covered with Portland or other approved cement, which may be mixed with sand or other suitable substance. Care to be taken to have a proper substance of cement at its termination, and to keep the watercourses clear all fore and aft. The whole to be to the satisfaction of the Surveyors.

2. Where asphalt, enamel cement, or similar compositions are to be used, the same must be sanctioned by the Owners, and samples are to be submitted for the approval of the Committee.

3. The condition of such compositions is to be ascertained by the Society's Surveyors biennially, and vessels coated with compositions as above described will be distinguished with a record of "Asp." in the Register Book.

RUDDER.

Section 36. 1. The rudder to be made to ship and unship while the vessel is afloat. The size of mainpiece, given in Table S 3, to be regulated by the number which regulates the thickness of the vessel's plating; it is to be of the best hammered iron or steel. It is also recommended that the stops on the steam steering engines should be fitted at a smaller angle than the stops on the rudder, in order to prevent excessive strain through the rudder being forced against the stops. The frame of the rudder and main piece to be one forging; the rudder to be stayed at intervals corresponding with the pintles. (*See* also Section 42 for Spar deck vessels, paragraph 16). The plating to be of the thickness given in Table S 1 for the lower half of bulkheads, and where practicable these plates should be in one length. The plates to be countersunk, and the rivets to have full heads and points. It is recommended that the pintles be made independent of the frame. They should be spaced not more than from 4 feet to 5 feet 6 inches, and the upper one should be placed as near as practicable to the rudder trunk, and the rudder plates should be secured to the frame with rivets of not less size than required for the upper edge of the garboard strake amidships, and spaced not more than five diameters from centre to centre. All vessels to have a spare tiller and gear ready for use if required.

2. Solid cast steel rudders of approved manufacture, and satisfactorily tested, will be admitted, if the particulars be, in the first instance, submitted to, and approved by the Committee. Where single plate rudders are adopted, the plate to be of the thickness given in Table S 3, and an arm to be fitted in way of each pintle, with an intermediate arm between ; the arms being fitted alternately on opposite sides of the plate.

3. The tests of cast steel rudders to be as follows :—A tensile test is to be made on a piece taken from each casting, and the extension on a length of 8 inches is not to be less than 8 per cent., and the tensile strength not less than 28 tons, nor more than about 35 tons per square inch. A cold bending test also to be made corresponding to each tensile test, and the sample to bend cold before fracture through an angle of at least 90°.

The rudders to be dropped from a height of from 7 to 10 feet, according to the design, shape, and weight of the casting. The casting in each case to be subsequently slung up and well hammered with a sledge hammer, not less in weight than 7 lbs., to satisfy the Surveyors that the castings are sound and without flaws existing either originally or developed as the result of the application of the preceding percussive tests.

WINDLASS AND HAWSE-PIPES.

Section 37. 1. The windlass, for all grades, if of wood, may be composed of any of the following timbers ; namely, English, African, or Live Oak ; Adriatic, Italian, Spanish, Portuguese or French Oak ; East India Teak, Morung Saul, Greenheart, Morra, or Iron Bark. The iron or steel spindle in all cases to pass through the body of the windlass.

2. The hawse-pipes must be of sufficient size and thickness, and the outside flange of proper form to admit of an easy lead for the cable to the windlass or capstan.

PUMPS.

Section 38. 1. In Steam Vessels the pumping arrangements according to the division of holds &c., to be as follows :—

2. **Holds with double bottoms.**—In the double bottom of each compartment of the hold and of engine and boiler space, a steam pump suction is to be fitted at the middle line, and one on each side to clear the tanks of water when the vessel has a heavy list. Where there is considerable rise of floor towards the ends of vessels, the middle line suction only will be required. A steam pump suction and a hand pump are also to be fitted to each bilge in each hold where there is no well. When there is a well, one or three steam pump suctions are to be fitted in the same according as there is considerable or little rise of floor, and hand pumps fitted at the bilges.

3. **Holds without double bottoms.**—Where there is considerable rise of floor, one steam pump suction and one hand pump are to be fitted in each hold. In vessels with little rise of floor, two or three steam pump suctions and at least one hand pump to be fitted to each hold.

4. **Engine and boiler space.**—Where a double bottom extends the whole length of engine and boiler space, two steam pump suctions are to be fitted to the bilge on each side. Where there is a well one steam pump suction should be fitted in each bilge and one in the well. Where there is no double bottom in the machinery space, centre and wing steam pump suction should be fitted. The rose box of the bilge injection is to be fitted where easily accessible, and is to be used for bilge water only. The main and donkey pumps to draw from all compartments, and the donkey to have also a separate bilge suction in the engine room.

5. **Fore and After Peaks.**—If the Peaks are fitted as water ballast tanks, a separate steam pump suction is to be led to each. If not used for water ballast, an efficient pump is to be fitted in the fore peak. If the after peak is used as a ballast tank, no sluice valve or cock is to be fitted to the after bulkhead; but if it is not so used, and if no pump is fitted in it, a sluice valve or cock is to be fitted to the after bulkhead, to allow water to reach the pumps when required.

6. **Tunnel.**—The tunnel well is to be cleared by a steam pump suction.

7. **All Hand Pumps** to be capable of being worked from the upper or main decks above the deep load water line.

8. **No Sluice Valve or Cock** is to be fitted to the collision bulkhead.

9. **No Sluice Valves or Cocks** are to be fitted to the engine room, or other watertight bulkheads, unless they are arranged so as to be at all times accessible.

10. **When Sluice Valves** are fitted, they are to be so arranged as to be controlled above the Load Water Line, and the rods are to be boxed in to prevent injury.

11. **Sounding Pipes** to be fitted on each side of holds and ballast tanks, and a doubling plate is to be fitted under each.

12. **Air Pipes** to be fitted to each ballast tank as required.

13. In addition to the engine pumps in steam vessels, an efficient pump is to be fitted in the bilges, on each side of the vessel, to each cargo compartment, for clearing the bilges of water when the vessel has a list, and to be capable of being worked from the upper or main deck; or such other arrangement may be adopted as may, when submitted to the Committee for their approval, be deemed satisfactory by them. An efficient pump is to be fitted in the forepeak. A doubling plate should be fitted under all sounding pipes

14. All **Cocks** and **Valves** in connection with bilge and ballast suction pipes are to be fitted in places where they are at all times accessible.

15. The **Pipes** for bilge or ballast suctions are to be fitted with flanged joints in convenient lengths, so that they may be easily disconnected for clearing. In the case of cast iron suction pipes, which are not also used as tank filling pipes, or which cannot be subjected to sea pressure, spigot and faucet joints made with india-rubber rings fitted over the spigots might be adopted, except in the case of bilge suction pipes passing through ballast tanks, which should be fitted with flanged joints.

16. The **Suction Pipes** to fore and aft peaks, and to the tunnel well, should not be less than $2\frac{1}{4}$ inches inside diameter, except in vessels under 500 tons under deck, in which case they may be made 2 inches.

17. The **Bilge Injection** should not be less than two-thirds of the diameter of the sea inlet to the circulating pump.

The inside diameter of other bilge suction pipes should not be less than given in the following Table :—

TONNAGE UNDER UPPER DECK.	Engine Room Centre Suction, Separate Donkey Suction, and Hold Centre Suctions.	Wing Suctions in Holds where no Centre Suctions are fitted, and Wing Suctions in Engine Room.	Wing Suctions in Holds where Centre Suctions are also fitted.
	Inches.	Inches.	Inches.
In vessels under 500 tons	2	2	2
„ 500 tons but under 1000 tons ...	$2\frac{1}{4}$	2	2
„ 1000 „ „ 1500 „ ...	$2\frac{1}{2}$	$2\frac{1}{4}$	2
„ 1500 „ „ 2000 „ ...	3	$2\frac{3}{4}$	$2\frac{1}{4}$
„ 2000 „ „ 3000 „ ...	$3\frac{1}{2}$	3	$2\frac{1}{2}$
„ 3000 tons and above	$3\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{3}{4}$

In cases where more than one suction to any one compartment are connected to the pumps by a single pipe, this pipe should be not less than the size required for the centre suction.

EQUIPMENT.

Section 39. 1. All vessels having masts, spars, rigging and sails, shall be required to have them maintained in good order.

2. Every ship is to be provided with anchors, cables, &c., of approved quality, tested at a *public machine* recognised by the Committee, in number and length as set forth in Table No. 22. (*See* after page 133).

3. To entitle vessels classed A "For Channel Purposes" to the Figure 1, the equipment of Anchors and Chain Cables, &c., should be as required by Table 22, with the exception that not more than two bower anchors and one stream anchor need be supplied. The first bower anchor should be of the full weight required by the Table, and the second bower may be 15 per cent. lighter. This rule, however, applies only to vessels intended for short passages.

4. In vessels classed "For Channel Purposes" which are intended for longer voyages, such as the Queenboro'-Flushing, the Channel Islands, or the Irish Sea service, the equipment must be in accordance with the requirements of Table 22.

5. In the cases of *foreign owned vessels* classed with the Figure 1, in which the chains and anchors, or part of the same, have been tested under the inspection of the Society's Surveyors at Proving Establishments out of the United Kingdom recognised by the Committee, and test certificates of the same are furnished, duly signed, by the Society's Surveyors and the Secretary, the vessel will have recorded in the Register Book the notation A.&C.P., A.P. or C.P. as the case may be. Where, however, the anchors or cable for *foreign owned vessels* are manufactured abroad, and test certificates are furnished setting forth that they have been tested at a Government machine, or at a machine under the control of a municipal body, or a similar responsible body, but not under the inspection of a Surveyor to the Society, the record

of A.&C.P., &c. will not be made in the Register Book, though such certificates will be accepted, as complying with the requirements of the Rules, for assigning the Figure 1, provided the remaining requirements of Table 22 be complied with.

6. A certificate of all chains and anchors having been tested, and of the strain applied to them, must be produced before the ship is classed with the Figure 1.

7. The equipment as regards anchors, chains, warps, &c., is to be regulated by the number produced by the sum of the measurements in feet arising from the addition of the half moulded breadth of the vessel at the middle of the length, the depth from the upper part of the keel to the top of the upper deck beams, with the normal round up, and the girth of the half-midship frame section of the vessel, measured from the centre line at the top of the keel to the upper deck stringer plate, multiplied by the length of the vessel for a one, two, and three-decked vessel, and for a spar-decked vessel. For a vessel having a complete awning-deck, or a continuous shade deck, the equipment number is to be increased one-eighth beyond that given by the measurements defined above to the main deck.

8. For a steam vessel with a partial awning-deck, poop, top-gallant forecastle, bridge-house or a raised quarter-deck, the equipment number is to be increased beyond that for a flush or spar-decked vessel by that proportion of the addition made for a complete awning-deck which the combined length of the erections bears to the length of the vessel.

9. All vessels under 150 tons to be provided with one good boat; and every vessel of 150 tons, and above, to have a suitable number. The Surveyors are to be particular in examining and reporting the condition of the boats of all vessels.

10. **Anchor Cranes** and **Boats' Davits** to be in accordance with Table 12.

11. The efficient state and condition of the whole of a vessel's equipment will be designated by the Figure 1 placed after the character assigned to the vessel; and in cases in which the equipment is found insufficient in quantity or defective in quality, a dash thus –, will be inserted in place of the Figure 1. In cases where the Figure 1 is expunged on account of deficiencies in the anchors or chains, the record of L.A.&C.P. or A.&C.P. will also be expunged.

REPORTS ON VESSELS.

Section 40. 1. The Surveyors, in submitting their Reports of vessels not already classed, are in all cases, where practicable, to forward a sketch of the midship section, and other drawings where necessary, to be furnished by the builders, with figured dimensions of the component parts marked thereon.

2. Builders wishing to adopt plans other than those described herein, are to submit them through the Resident Surveyors (who are to state their opinions thereon) for the Committee's consideration and approval.

"THREE-DECK" STEAM VESSELS.

Section 41. Steam vessels not less than 17 feet depth from top of keel to the middle deck, having two or more complete decks laid and caulked, and a tier of hold beams, or extra strong beams, or web-frames and stringers in lieu thereof, will have their scantlings determined as follows:—Such vessels to be denoted in the Register Book, "3Dks," or "2Dks3trB.," "2Dks&web frames," or "2Dks&deep framing," as the case may be.

2. The scantlings and spacing of the frames, reversed frames and floor-plates, the thickness of bulkheads, and diameter of pillars, are determined by the number produced by the deduction of *seven feet* from the sum of the measurements in feet arising from the addition of the half-moulded breadth of the vessel amidships, the depth from the upper part of the keel to the top of the *upper deck beams*, with the normal round-up, at the middle of the vessel's length, and the girth of the half-midship frame section of the vessel, measured from the centre line at the top of the keel to the upper deck stringer plate.

3. The scantlings of the keel, stem, sternpost; the thickness of the outside plating, keelson and stringer plates, and deck; also the scantlings of the angle bars on beam stringer plates, and keelson and stringer angles in hold, as in Tables S 2, S 3, and S 5, are governed by the number obtained by multiplying that which regulates the size of the frames, &c., by the length of the vessel.

4. All the frames are to extend to the upper deck stringer plate.

5. The reversed frames are to extend to the upper part of the middle deck beam stringer angle, and to the upper part of the frames alternately.

6. The plating to be of the thickness given in Table S 2, from the keel to the gunwale; the sheerstrake to be placed at the gunwale, and the strake of plating in way of the middle deck to be an outside strake.

7. The upper and middle deck stringer plates to be of the breadth and thickness prescribed in Table S 5. The middle deck stringer plate to be fitted and connected to the outside plating by angles between the frames of the size given for beam stringer angles; and in addition, an inner stringer angle bar of the same size, passing continuously fore and aft, must be riveted to reversed angles on each frame, and to the stringer plate, the space between this angle bar and the outside plating, all fore and aft, to be filled in and made water-tight. Similar angle bars are to be riveted to the stringer plate, reversed frames, and outside plating at the lower deck stringer.

8. The butt-straps of the sheerstrake and upper and middle deck stringer plates, and of not less than three strakes of plating at the bilge to be treble riveted, for not less than half the vessel's length amidships, and otherwise as per Section 20.

9. In these vessels a side intercostal keelson is to be fitted and attached to the outside plating by angle bars of not less size than $3 \times 3 \times \frac{8}{20}$; but if the plating number is 21,700 and under 30,400, these angle bars to be $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$; if of this number and above, they are to be not less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$. When a double bottom is fitted, this keelson may be dispensed with in the range thereof.

10. The thickness of the flat of upper deck is to be as given in Table S 3. In all cases a middle deck is to be properly laid and caulked, the thickness of which may be one half inch less than that prescribed for the upper deck.

11. Engine-room hatchways on the middle deck are to be enclosed by steel or iron trunk bulkheads, efficiently strengthened, and extended from the middle deck to the upper deck, as prescribed in Sec. 29.

12. If in such vessels the length exceeds *eleven* times the depth taken from the *upper part of the keel* to the top of the *middle deck beams*, additional strength will be required at the bilge and bottom, as per Table S 6; but no additional strength at the sheerstrake and stringer plate will be needed until the length exceeds *eleven* times the depth taken from *the upper part of the keel* to the top of the

upper deck beams; when this is the case, additional strength will be required in the *upper deck* sheerstrakes and stringers, as per Table S 6 relating to vessels' proportions.

13. In steam vessels requiring by Table S 5 to have not more than *one steel* deck, and in which the scantlings, &c., are not less than those required by the foregoing Rules for 3 deck vessels, the *wood middle deck* may be dispensed with, subject to an addition (to be approved by the Committee), being made to the freeboards required by the Load Line Act for ordinary 3 deck vessels, which have the middle deck laid: the freeboards thus assigned by the Committee to be marked on the vessels' sides, inserted in the certificate of classification, and recorded in the Register Book. Such vessels will be classed in the Register Book '*with freeboard*,' and the record of decks, &c., will be 1 Dk. (Stl.) 2 trs. B. & web frames or deep framing, 3 deck rule.

If it is desired to compensate for the omission of the wood middle deck, and to retain the normal freeboard, the frames and reverse frames only are to be regulated by the measurements taken to the upper deck without the deduction of 7 feet, and all the reverse frames are to be extended to the upper deck, or increased width or thickness of stringers, or other suitable compensation in lieu thereof, may be submitted for the Committee's approval.

SPAR-DECKED STEAM VESSELS.

Section 42. 1. Vessels noted in the Register Book as "Spar-deck" are those which are of lighter construction* than vessels built under the "Three deck" rule having the same dimensions, taken with reference to the total depth of the spar or upper deck in either case.

2. They must have three tiers of beams and be not less than 17 feet depth from top of keel to the main deck. The Committee, however, will approve of the construction of Spar-deck vessels having a somewhat less depth of hold provided the plans be in the first instance submitted for approval. For such vessels having less than 17 feet depth from top of keel to the main deck, a minimum freeboard must also be submitted to the Committee for approval, and the freeboard sanctioned is to be inserted in the Certificate and in the Register Book, and marked on the ship's sides.

3. In cases where erections are required on the spar deck, plans must be submitted showing the additional strengthening proposed, which must be to the satisfaction of the Committee.

4. In such vessels the scantlings and arrangements are to be regulated by the dimensions under the main deck, as in those having one or two decks.†

5. *All* the frames must extend to the spar-deck stringer plate.

6. The reversed angle bars on the frames are to extend to the upper part of the main deck beam stringer angle, and to the upper part of the frames, alternately.

7. The main and spar deck sheerstrakes, and the plating between them, to be in thickness as prescribed in Table S 2. The riveting of the butts of the plating between these sheerstrakes to be regulated by Section 19, paragraph 11, and Section 20.

8. A reduction of $\frac{1}{20}$ of an inch from the thickness required by the upper line of Table S 5 for stringer and tie-plates will be allowed for those of the spar deck.

* This does not necessarily imply that the vessel is of less strength in relation to the amount of dead-weight carried at a suitable load-line.

† Where the height between the main and spar-deck stringers at the sides is 8 feet or above at any part, additional transverse strength will be required to the satisfaction of the Committee.

9. The butt-straps of the spar and main deck sheerstrakes and stringer plates, and of not less than three strakes of plating at the bilges, to be treble riveted for at least half the vessel's length amidships, and otherwise as per Section 20.

10. In these vessels a side intercostal keelson is to be fitted and attached to the outside plating by angle bars of not less than $3 \times 3 \times \frac{8}{20}$; but if the plating number is 21,700 and under 30,400 these angle bars to be $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$; if of this number and above, they are to be not less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$. When a double bottom is fitted, this keelson may be dispensed with in the range thereof.

11. The lower edge of the main sheerstrake must not be more than one-half its depth below the main-deck stringer plate.

12. The main-deck stringer plate is to be fitted and connected to the sheerstrake by angle bars between the frames, of the size given for beam stringer angle bars, and in addition, an inner stringer angle bar of the same size, passing continuously fore and aft, must be riveted to reversed angle bars on each frame, and to the stringer plate; the space between this angle bar and the sheerstrake, all fore and aft, to be filled in and made water-tight. Similar angle bars are to be riveted to the stringer plate, reversed frames, and outside plating at the lower deck.

13. These vessels are to have a complete main deck $3\frac{1}{2}$ inches in thickness, laid and caulked.

14. The flat of spar deck to be not less than $3\frac{1}{2}$ inches in thickness.

15. Engine-room hatchways on the main deck are to be enclosed by steel or iron trunk bulkheads, efficiently strengthened and extended from the main deck to the spar deck. (*See* Section 29.)

16. The diameters of rudder head and pintles to be regulated by the number which regulates the plating of a three deck vessel of the same dimensions. (*See also* Section 36.)

17. The measurement of depth, for regulating the additional strength required for vessels of extreme proportions, is to be taken from the upper part of keel to the top of the *main deck beams.*

18. When Table S 6 applies to these vessels, the increased strength defined for sheerstrakes is to be added to those of either the spar or main deck.

19. They are to have extra strength at the bilge and bottom in the proportion of their length to depth from main deck as prescribed in Table S 6; they may, however, be 13 and under 14 depths in length before they are required to have the remaining extra strength prescribed for vessels of 11 to 12 depths in length, and such vessels exceeding the above proportions to have extra strength in the same relation to that prescribed for one and two-decked vessels. In no case will the material at the upper part and the number and thickness of steel or iron decks be required to be greater than that of the three-deck vessel of the same dimensions.

20. Vessels to which this rule applies will be noted in the Register Book thus :—"*Spar dk.*"

AWNING DECKED STEAM VESSELS.

Section 43. 1. An awning-decked vessel is one having a comparatively light superstructure fore and aft on the main deck proper of the vessel, intended to shelter passengers or cattle, or for the conveyance of cargo either light in its nature or limited in quantity. In such vessels the scantlings and arrangements of the frames, reversed frames, the thickness of bulkheads, and diameter of pillars in Table S 1, are to be regulated by the dimensions under the main deck, as in a one or two-deck vessel, exclusive of the awning-deck.

It is a condition on which an awning or partial awning-decked vessel is classed in the Society's Register Book that the freeboard assigned shall be marked on the vessel's sides as hereafter described. If the vessel proceed to sea with a less freeboard than that approved by the Committee, or if the freeboard mark be placed higher than the position assigned by the Committee, the vessel will be liable to have her class expunged from the Register Book.*

2. The plans of such vessels and a minimum freeboard must be submitted to the Committee for approval, and the freeboard thus sanctioned is to be inserted in the Certificate and in the Register Book, and marked on the ship's sides.*

3. In all such cases, if the vessel has for any reason forfeited her character, the freeboard assigned as a condition of classification will be omitted in reprinting the Register Book, unless the character be previously reinstated.

4. Vessels to which this rule applies, as regards an entire awning deck, will be noted in the Register Book thus, "*Awng dk.*"

5. Such erections only as are necessary for navigating these vessels will be allowed on the awning deck, unless plans are submitted to, and approved by, the Committee.

6. All the main frames must extend to the awning-deck stringer plate, or to the lower part of the curve when of a rounded form at the gunwale. To be of the size given in Table S 1, but in no case to be less than $3\frac{1}{2} \times 3 \times \frac{6}{20}$.

7. The whole of the reversed frames are to be extended to the top of the main-deck stringer angle bar.

8. All the side plating above the main sheerstrake to be not less than as given in Table S 2.

9. The awning-deck stringer plate to be of the breadth given in Table S 5 for hold beam stringers, and of the following thicknesses, namely :—

In vessels whose plating number is under 13,000,			not less than $\frac{6}{20}$	of an inch.
„	13,000 and under 18,000,		„ $\frac{7}{20}$	„
„	18,000 „	24,000,	„ $\frac{8}{20}$	„
„	24,000 „	31,000,	„ $\frac{9}{20}$	„

When the number for plating exceeds 31,000, or the vessel exceeds thirteen depths in length to the main deck, special arrangements must be made for affording the requisite longitudinal strength at the gunwale to the satisfaction of the Committee.

10. The tie-plates to be of the same thickness as given above for the stringer plates, and to be in breadth as in Table S 5 for main deck tie-plates.

11. The butts of the awning-deck side plating above the main deck, and of the awning-deck stringer and tie plates, are to be double riveted.

12. A reduction of one-fourth from the thickness prescribed for the main deck will be allowed for the flat of awning-deck.

13. The beams to be of the sizes given in Table S 4. They are to be placed at every alternate frame, and, if the vessel is of a rounded form at the gunwale, to scarph the main frames not less than eighteen inches, and to be properly riveted to them. For diameters of pillars *see* Table S 1.

* See Notice of Freeboard requirements printed at end of Rules.

14. These vessels are to have a complete main deck laid and caulked, and coamings and hatches fitted as to a weather deck.

15. Engine-room hatchways on the main deck are to be enclosed by steel or iron trunk bulkheads, efficiently strengthened and extended from the main deck to the awning-deck. (*See* Section 29.)

16. Rounded gunwale plating to be not less in thickness than required for the awning-deck stringer plate, and to have a gunwale angle bar of the size required by Table S 3.

17. The gunwale must be properly constructed to the satisfaction of the Surveyors.

18. The main-deck stringer plate is to be fitted and connected to the sheerstrake by angle bars between the frames, of the size given for beam stringer angles ; and, in addition, an inner stringer angle bar of the same size, passing continuously fore and aft, must be riveted to reversed angles on each frame, and to the stringer plate ; the space between this angle bar and the sheerstrake, all fore and aft, to be filled in and made water-tight.

POOPS, FORECASTLES, AND BRIDGE-HOUSES.

Section 44. 1. In full poops, forecastles, and bridge-houses, a reduction of one-fourth from the dimensions which would be required in the same range if the vessel were flush-decked (exclusive of additions for extreme proportions) will be allowed in the outside plating, stringer and tie-plates upon beams, angle bars or stringer plates, and flat of deck. The side plating need not exceed the thickness required for awning-decked vessels. The butts to be double riveted.

2. All frames to extend to the poop or forecastle stringer plate, or to the lower part of the curve when of a rounded form at the gunwale, and a continuous angle bar of the size given for the lower deck stringer angle is to be wrought on the upper deck stringer plate inside the frames, as prescribed in Section 16, paragraph 7. The beams to be of the size given in Table S 4, and they are to be efficiently pillared. A beam to be placed at every alternate frame to scarph the main frames not less than eighteen inches, and to be properly riveted to them.

3. The rounded gunwale plating may be of the thickness required for the poop or forecastle stringer plates. The gunwale must be properly constructed to the satisfaction of the Surveyors.

4. Bulkheads at the fore end of long poops and long bridge houses to be of the thickness of their side plating, with coaming plates $\frac{1}{20}$ of an inch thicker than their bulkheads, and to be stiffened with bulb plates of not less size than those required for forecastle beams, and angles of the size required for the vessel's reverse frames, spaced 30 inches apart, and connected both to the coaming plates and to the deck plating, or to an athwartship plate on the beams both below and above, with a bracket-plate to each end of the bulb stiffener ; or other equivalent strength introduced.

5. Bulkheads at the fore end of short poops and bridge houses to be of the thickness of their side plating, with coaming plates $\frac{1}{20}$ of an inch thicker, and to be stiffened with angle bars the size of the frames spaced 30 inches apart.

6. The bulwark plating at the fore and after ends of the bridge to be increased in thickness and supported by bracket knees, and the freeing ports at this part should, in order to preserve a continuity of strength, have rounded corners and a substantial rim.

7. Where the poop exceeds one-fourth of the vessel's length, the sheerstrake is to be doubled, and

the upper deck stringer plate increased in thickness in way of the break, for a length of from 20 to 30 feet, at this part, to the satisfaction of the Surveyors.

8. In top-gallant forecastles of vessels whose plating number is 18,000 and above, the alternate reversed frames are to extend to the forecastle deck, or a double angle stringer of the size required for reversed frames is to be fitted inside the frames midway between the upper and forecastle decks, connected at the fore-end by an efficient breasthook ; or other equally efficient means of strengthening the forecastle may be adopted if approved by the Committee.

9. Where it is proposed to fit a poop or top-gallant forecastle to a vessel under 14 feet depth of hold, the plans are to be submitted for the consideration of the Committee.

10. Where bridge-houses are fitted, the whole of the frames are to be extended to the height of the bridge-deck, or be connected to the stringer plates by knees and bracket-plates, and the gunwale angle bar made continuous. Where efficient partial bulkheads are fitted, the alternate frames only need extend to the height of the bridge-deck. When the frames are extended through the upper deck stringer plate there must be a continuous angle bar of the size given for lower deck stringer angles, wrought on the upper deck stringer plate, inside the frames.

11. Where the combined length of the poop, or raised quarter deck, and bridge-house exceeds two-fifths the vessel's length, and the plating number is 15,000 and above, the sheerstrake should be doubled for one-half the vessel's length amidships, or other equivalent strength should be added to the satisfaction of the Committee.

12. This additional strengthening to be given also to vessels of over 11 depths in length and whose plating number is 15,000 and above, where a bridge-house is fitted of a length equal to or exceeding one-fifth the length of the vessel.

13. The doubling to the sheerstrake required by paragraph 11 may be dispensed with in vessels having bridge-houses not less than two-fifths the length of the vessel, provided the bridge side plating be increased in thickness, and the upper strake treble riveted with buttstraps $\frac{1}{20}$ of an inch thicker than the plates, the bridge stringer plates be increased in breadth and thickness, a $\frac{5}{16}$ iron or $\frac{6}{20}$ steel bridge-deck be fitted, the landing edges of bridge side plating be double riveted and the main sheerstrake be doubled at the ends of the bridge house with plates 18 to 20 feet long. The thickness of bridge side plating and stringer plates to be as follows, and the bridge stringer angles of the size required for lower deck stringer angles :—

Plating numbers.	Bridge Sheerstrake.	Bridge Side plating.	Bridge Stringer plates.
Under 15,000	$36 \times \frac{8}{20}$	$\frac{8}{20}$	$36 \times \frac{8}{20}$
15,000 to 18,000	$36 \times \frac{9}{20}$	$\frac{8}{20}$	$36 \times \frac{8}{20}$
18,000 to 21,000	$36 \times \frac{10}{20}$	$\frac{9}{20}$	$38 \times \frac{9}{20}$
21,000 to 24,000	$36 \times \frac{10}{20}$	$\frac{9}{20}$	$40 \times \frac{10}{20}$
24,000 to 27,000	$36 \times \frac{11}{20}$	$\frac{9}{20}$	$40 \times \frac{10}{20}$

RAISED QUARTER-DECKS AND SUNK FORECASTLES. (*See Sketches on page* 129.)

Section 45. 1. Side plating of raised quarter-decks and sunk forecastles may be $\frac{1}{20}$ of an inch less in thickness than topside plating below it if the topside plating be $\frac{7}{20}$ of an inch in thickness or more.

2. The frames in all cases, and the reversed angles on alternate frames, are to extend to the raised quarter-deck and forecastle stringer plate.

3. The upper deck sheerstrake is to extend to the stern. The front or break bulkhead of the raised quarter-deck is to be stiffened by an athwartship plate, of not less size than the upper deck beam tie-plates, and efficiently connected to it by angle bars; this athwartship plate is to receive the deck ends, and is to be supported by bracket plates when not riveted to a beam.

4. The number and arrangement of hold beams, beam stringers, and stringers in hold, in way of raised quarter-decks, must be in accordance with the Rules for the increased depth of the vessel, and the height of the reversed angles on the frames is to be regulated by the number for scantlings which the increased depth would give. The main sheerstrake to be doubled for a reasonable distance before and abaft the break. Where, however, the raised quarter-deck is connected to a bridge-house, it is preferred that in lieu of this, the raised quarter-deck side plating should be doubled at the break for the same length. Should the raised quarter-deck side plating not be doubled, it must be increased in thickness at the break, in addition to the sheerstrake being doubled. The bulwark plate of the raised quarter-deck adjoining the bridge side plating to be increased in thickness, and the sheerstrake doubled at front of bridge. The butts of the side plating and stringers at these parts to be carefully arranged, and the butts of the raised quarter-deck side plating, main sheerstrake, and the strake of plating next below, are to be treble riveted in the neighbourhood of the break, and the butt-straps increased in thickness. The main deck stringer plate is to extend abaft the break about seven frame spaces and the raised quarter-deck stringer plate about four frame spaces before the break and the stringer plates below the main deck are to have a shift of about 16 feet overlap; the bridge stringer also is to extend abaft the break. *The size of beams of raised quarter-decks to be regulated as prescribed in Table S 4.*

5. In such vessels, of extreme proportions requiring by Table S 5 a steel deck, or part steel deck, where the raised quarter-deck is of considerable length, the main deck plating is to scarph the raised quarter-deck for a length of two to three frame spaces according to the size and proportions of the vessel. There are to be from four to five diaphragm plates of the thickness of the main deck plating, connecting the two decks, and attached to the bulkhead and decks by double angles and stiffened by an angle on the after edges. The raised quarter-deck side plating is to be doubled at this part for a length of 18 to 20 feet.

6. Web plates not less than 15 inches deep to be fitted on the fore side of the bulkhead in way of the diaphragm plates, efficiently bracketed to the main and bridge deck plating.

7. Where the plating number is 24,000 and under 26,000, the main and raised quarter decks are to be scarphed four frame spaces, and where the plating number is 26,000 and above, five frame spaces. The webs on the fore side of the break bulkhead are to be not less than 18 inches deep. In such vessels the raised quarter-deck side plating is to be doubled, commencing at one-fourth the length of the vessel from the stern and extending to 8 feet beyond the break of the raised quarter-deck.

8. The break bulkhead to be of the thickness of the bridge side plating, and stiffened with angles of the size of the frames spaced 30 inches apart.

9. Where the plating number exceeds 20,000, or the vessel is over 13 depths to length, the break bulkhead is to be not less than four frame spaces abaft the after end of the engine room opening.

10. Vessels which from their size and proportions do not require the decks to be scarphed, are to have from four to five bracket knees fitted on each side of the break bulkhead, the thickness of which is not to be less than that of the main deck plating.

11. The raised quarter-deck plating should be attached to the break bulkhead by double angles of not less size than that given in Table S 3 for middle deck stringer angles.

12. Where the combined length of the poop or raised quarter-deck and bridge-house exceeds two-fifths the vessel's length, and the plating number is 15,000 and above, the sheerstrake to be doubled for one half the vessel's length amidships, or other equivalent strength added, to the satisfaction of the Committee.

VESSELS OF EXTREME PROPORTIONS.

Section 46. 1. Additional longitudinal strength, beyond that stated in the foregoing rules, and in Tables S 2, S 3, and S 5, will be required for vessels of extreme proportions, as shown in Table S 6.

2. *The length, breadth, and depth to be taken as per Section 1.*

3. For all vessels exceeding in length sixteen depths to the middle deck*, plans must be submitted for the approval of the Committee for giving the vessels sufficient additional strength longitudinally; and all vessels having a length of thirteen depths and above to the upper deck, are to have a substantial erection extending over the midship half length of the vessel.

4. In all cases where keelsons, or other additions, are required for a certain portion of the length of a vessel, care should be taken to avoid any abrupt termination of this additional strength by tapering the keelsons, &c., beyond these limits, and properly shifting their terminations.

VESSELS NOT BUILT UNDER SURVEY.

Section 47. 1. In cases of vessels not surveyed while building, for which a character may be required, application must be made to the Committee in writing, and such drawings, with scantlings of the vessel marked thereon, as may be obtainable, should be furnished, also particulars of the testing of the steel used in the construction of the vessel. The Committee will then direct a special examination to be made by two Surveyors of the Society (one of whom shall be an exclusive officer), for which purpose the vessel is to be placed on high blocks in a dry dock or on ways; the hold to be cleared and proper stages made; the rivets and plating of keel, and flat of bottom, thoroughly examined; the close ceiling in the hold to be removed where deemed necessary, but in no case less than required for Special Survey No. 2. The coal bunkers of steam vessels to be cleared; the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulkheads, rivets, and inner surface of the plating exposed to view;† all oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, stern-post, and rudder.

*All vessels, excepting those with an awning deck, whose plating number exceeds 35,000 and exceeding 16 depths in length, taken from the main deck, are to have the whole of the reversed frames extended to the gunwale for half the vessel's length amidships, or a sufficient number of partial bulkheads fitted in the 'tween decks to the approval of the Committee. In the case of awning-decked vessels, they are all to extend to the main deck.

† In cases where the inner surface of the bottom plating is coated with cement or asphalte, if the coating be carefully inspected, and tested by beating or chipping and found sound and adhering satisfactorily to the steel, its removal may be dispensed with, provided that upon the removal of a portion, the plating, frames, and rivets under it be found in satisfactory condition.

2. When the vessel is so prepared, the Surveyors are to ascertain the scantlings of the various parts, and verify the particulars given on the drawings furnished, drilling the shell plating where deemed necessary for this purpose. A few rivets are to be removed from various parts to ascertain their quality and the character of the countersinking and workmanship. A full report is to be made on a first entry report form for the information of the Committee, who will then assign the vessel such character as the facts may appear to them to warrant.

3. In addition to the above, if the age of the vessel be ten years or upwards, the requirements of the Special Survey No. 3 are to be complied with. The periodical surveys are subsequently to be held as in the case of vessels built under survey.

4. In steam vessels the Engines and Boilers are to be opened out for Survey, at least to the extent required for the Special Surveys Nos. 1, 2, and 3. The Screw Shaft is to be drawn and examined. The arrangements of sea cocks, bilge suctions, valves, etc., are to be made to conform to the requirements of the Rules, and the working pressure of the boilers is to be determined from their actual scantlings in accordance with the Rules for the construction of boilers, and particulars should be furnished respecting the testing of the steel.

By order of the Committee,

A. G. DRYHURST,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.

17th December, 1896.

RULES

FOR THE

SURVEY AND CONSTRUCTION OF ENGINES AND BOILERS OF STEAM VESSELS.

1. In steam vessels, the machinery and boilers are to be inspected throughout construction, the boilers tested by hydraulic pressure, and the machinery tested under steam by the Society's Engineer-Surveyors, who will furnish a report to the Committee describing them in the manner shown in form No. 8. If found satisfactory, the Committee will thereupon grant a certificate, and insert in the Register Book the notification, "LMC" *in red* (*i.e.* "LLOYD'S MACHINERY CERTIFICATE"), indicating that the machinery and boilers are certified to be in good order and safe working condition.

SPECIAL SURVEY OF NEW ENGINES OR BOILERS.

2. In steam vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey.

3. In cases of machinery or new boilers being built under Special Survey, the distinguishing mark ✠ will be noted in red, thus : "✠LMC," or "✠NE & B," or "✠NB."

4. In order to facilitate this inspection, the plans of the machinery and boilers are to be examined and from them the working pressure fixed.

5. The Surveyors are to examine the materials and workmanship from the commencement of the work until the final test of the machinery under steam ; any defects, &c., to be pointed out as early as possible.

6. The Surveyors may also, if desired, compare the work as it progresses with the requirements of the specification agreed upon by the parties concerned, and certify to the conditions thereof, as far as can be seen, being satisfactorily complied with.

BOILERS.

7. The Surveyors will be guided in fixing the working pressure by the tables and formulæ annexed. (*See* paragraph 40.)

8. Any novelty in the construction of the machinery or boilers to be reported to the Committee.

9. The boilers, together with the machinery, to be inspected at different stages of construction.

10. The boilers to be tested by hydraulic pressure, in the presence of the Engineer-Surveyor, to twice he working pressure, and carefully gauged while under test.

11. Two safety valves to be fitted to each boiler, and loaded to the working pressure in the presence of the Surveyor. In the case of boilers of greater working pressure than 60 lbs. per square inch, the safety valves may be loaded to 5 lbs. above the working pressure. If common valves are used their combined areas to be at least half a square inch to each square foot of grate surface. If improved valves are used, they are to be tested under steam in the presence of the Surveyor; the accumulation in no case to exceed 10 per cent. of the working pressure.

12. An approved safety valve also to be fitted to the super-heater.

13. In winch boilers one safety valve will be allowed, provided its area be not less than half a square inch per square foot of grate surface.

14. Each valve to be arranged so that no extra load can be added when steam is up, and to be fitted with easing gear which must lift the valve itself. All safety-valve spindles to extend through the covers and be fitted with sockets and cross handles, allowing them to be lifted and turned round in their seats, and their efficiency tested at any time.

15. Stop-valves to be fitted so that each boiler can be worked separately.

16. Each boiler to be fitted with a separate steam gauge, to accurately indicate the pressure.

17. Each boiler to be fitted with a blow-off cock independent of that on the vessel's outside plating.

18. The machinery and boilers are to be securely fixed to the vessel to the satisfaction of the Surveyor.

STEEL BOILERS.

19. In cases where it is proposed to construct boilers of steel for classed vessels, or vessels intended for classification, the material is required to fulfil the following conditions (*See* Circular, No. 438*, page 104) :—

1. The material of stays and of plates is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section.

   In all cases the ultimate elongation must not be less than 20 per cent. in a length of 8 inches.*

   It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red, and quenched in water of 82° Fahrenheit.

2. Steel rivets are to be considered as part of the material, and in addition to being subjected to a shearing test they must be capable of withstanding the same tests as the plates are required to undergo.

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented. In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the construction of boilers.

*Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

4. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.
5. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.
6. No steel stays are to be welded.
7. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

ENGINES.

20. The engines are to be fitted with two feed-pumps, each capable of supplying the boilers; the pumps, &c., to be so arranged that either can be overhauled whilst the other is at work.

21. The engines are to be fitted with two bilge pumps, which are to be so arranged that either can be overhauled whilst the other is at work.

22. In engines of 70 H.P. and under, one feed-pump and one bilge-pump will be deemed sufficient, provided they are of adequate capacity.

The main feed pumps may be worked by independent engines provided they are fitted with automatic regulators for controlling their speed. If only one such pump is fitted for the main feed, the auxiliary feed pump required by paragraph 25 should also be fitted with an automatic speed regulator.

23. A bilge injection, or a bilge suction to the circulating pump, is to be fitted.

24. The engine bilge-pumps are to be fitted capable of pumping from each compartment of the vessel. The mud boxes and roses in engine room are to be placed where they are easily accessible, and to the satisfaction of the Surveyor.

25. A steam pump is to be provided capable of supplying the boilers with water; this pump to be provided with suctions to the hotwell and also to the sea. A steam pump is to be so fitted as to pump from each compartment, to deliver water on deck, and if no hand pump is fitted in engine room it must be fitted to be worked by hand. In small vessels in which only one steam pump is fitted, it must comply with all the requirements.

26. In all steam pipes provision is to be made for expansion and contraction to take place without unduly straining the pipes, and all main steam pipes are to be tested by hydraulic pressure to twice the working pressure, in the presence of the Engineer Surveyor.

27. All discharge-pipes to be, if possible, carried above the deep load-line, and to have discharge valves fitted on the plating of the vessel in an accessible position.

28. No pipes are to be carried through the bunkers without being properly protected.

29. Bilge suction-pipes to be arranged to pump direct from each compartment, the roses to be fixed in places where they can be easily accessible.

SHAFTS.

30. All shafts are to be examined when rough turned and finished.

31. Gauges of an approved description for testing the truth of the crank shafts are to be supplied with all new engines, and adjusted in the presence of the Surveyor.

For dimensions of shafts, see the formula in paragraph 41.

STEEL CASTINGS.

32. **Steel Castings** may be used for engine purposes provided they fulfil the Committee's requirements, which are as follow :—

1. For purposes for which **Cast Iron** is ordinarily employed, such as propeller bosses and blades, bed plates, engine framing and columns, brackets, weigh-shaft levers, pistons, cylinder covers, eccentric straps, bearing bushes, &c., the castings must be sound, and are to be subjected to such drop and hammering tests as are practicable.
2. For shafts or parts of shafts, and for purposes for which **forgings** are ordinarily employed, the material must also be subjected to the following tests :—
3. A tensile test is to be made from a piece taken from each casting. The tensile strength is not to exceed 30 tons per square inch, and the elongation is not to be less than 10 per cent. in a length of 8 inches, and a cold bending test, turned to $1\frac{1}{4}$ inches diameter or planed to $1\frac{1}{4}$ inches square, is to be capable of being bent without fracture through an angle of 90° over a radius not greater than $1\frac{3}{4}$ inches.
4. All steel castings are to be thoroughly annealed.

COCKS, PIPES, AND SEA CONNECTIONS.

33. With a view to insuring better control over cocks, valves, and pipes connecting the engines and boilers with the sea, they are to be fixed as follows, in all new vessels and vessels having *new engines or boilers* :—

34. All sea-cocks to be fitted on the plating of the vessel above the level of the stoke-hold and engine-room platforms, or attached to Kingston valves of a height sufficient to lift them up to the level of these platforms.

35. The bolts securing all cocks or sea connections to the plating of the vessel are to be tapped into the plating of the vessel or fitted with countersunk heads.

36. The blow-off cocks on the plating of the vessel are to be fitted with spigots passing through the plating, and a brass or gun-metal ring on the outside. The cocks are to be so constructed that the key or spanner can only be taken off when the cock is shut.

37. Cocks and valves connecting all suction pipes to be fixed above the stoke-hold and engine-room platforms.

38. The arrangements of pumps, bilge injections, suction and delivery pipes, to be such as will not permit of water being run from the sea into the vessel by an act of carelessness or neglect. Any defective arrangement to be reported to the Committee.

SPARE GEAR.

39. The articles of spare gear mentioned in the following list will be required to be carried in all steam vessels classed in the Society's Register Book, viz. :—

2 connecting rod or piston rod top-end bolts and nuts.
2 connecting rod bottom-end bolts and nuts.
2 main bearing bolts.
1 set of coupling bolts.
1 set of feed and bilge pump valves.
1 set of piston springs (where common springs are used).
A quantity of assorted bolts and nuts
Iron of various sizes.

In addition to the foregoing the following articles are recommended to be carried with a view to expedite repairs and lessen delay in distant ports, viz. :—

- Crank shaft.
- Propeller shaft.
- Propeller, or a full set of blades.
- Stern bush, or lignum vitæ lining for bush.
- 1 pair of connecting rod brasses.
- 1 pair of cross head brasses.
- 1 set of link brasses.
- 1 eccentric strap complete.
- Air pump rod.
- Circulating pump rod.
- H. P. valve spindle.
- L. P. valve spindle.
- 1 set of check valves.
- 6 cylinder cover bolts.
- 6 junk ring bolts.
- 4 valve chest cover bolts.
- 2 dozen boiler tubes.
- 3 dozen condenser tubes.
- 1 cylinder escape valve and spring.
- 1 set of safety valve springs.

RULES FOR DETERMINING THE WORKING PRESSURE TO BE ALLOWED IN NEW BOILERS.

CYLINDRICAL SHELLS OF IRON BOILERS.

40. The strength of circular shells of iron boilers to be calculated from the strength of the longitudinal joints by the following formula :—

$$\frac{\mathbf{C} \times \mathbf{T} \times \mathbf{B}}{\mathbf{D}} = \text{working pressure.}$$

where $\mathbf{C}$ = co-efficient as per following table,

$\mathbf{T}$ = thickness of plate in inches,

$\mathbf{D}$ = mean diameter of shell in inches,

$\mathbf{B}$ = percentage of strength of joint found as follows—the least percentage to be taken.

For plate at joint $\mathbf{B} = \dfrac{p - d}{p} \times 100.$

For rivets at joint $\mathbf{B} = \dfrac{n \times a}{p \times \mathbf{T}} \times 100$ with iron rivets in iron plates with punched holes.

$\mathbf{B} = \dfrac{n \times a}{p \times \mathbf{T}} \times 90$ with iron rivets in iron plates with drilled holes.

(In case of rivets being in double shear, $1{\cdot}75a$ is to be used instead of a.)

where p = pitch of rivets,

d = diameter of rivets,

a = sectional area of rivets,

n = number of rows of rivets.

Mem.—In any case where the strength of the longitudinal joint is satisfactorily shown by experiment to be greater than given by this formula the actual strength may be taken in the calculation.

TABLE OF CO-EFFICIENTS.

IRON BOILERS.

Description of Longitudinal Joint.	For Plates ½-inch thick and under.	For Plates ¾-inch thick and above ½-inch.	For Plates above ¾-inch thick.	
Lap Joint, Punched Holes	155	165	170	
Lap Joint, Drilled Holes	170	180	190	
Double Butt Strap Joint, Punched Holes	170	180	190	
Double Butt Strap Joint, Drilled Holes	180	190	200	

Note.—The inside butt strap to be at least ¾ of the strength of the longitudinal joint.

CYLINDRICAL SHELLS OF STEEL BOILERS.

The strength of cylindrical shells of steel boilers is to be calculated from the following formula :—

$$\frac{\mathbf{C} \times (\mathbf{T} - 2) \times \mathbf{B}}{\mathbf{D}} = \text{working pressure in lbs. per square inch.}$$

where $\mathbf{D}$ = mean diameter of shell in inches.

$\mathbf{T}$ = thickness of plate in sixteenths of an inch.

$\mathbf{C}$ = 20 when the longitudinal seams are fitted with double butt straps of equal width.

$\mathbf{C}$ = 19·25 when they are fitted with double butt straps of unequal width, only covering on one side the reduced section of plate at the outer lines of rivets.

$\mathbf{C}$ = 18·5 when the longitudinal seams are lap joints.

$\mathbf{B}$ = the least percentage of strength of longitudinal joint found as follows :—

For plate at joint $\mathbf{B} = \dfrac{p - d}{p} \times 100$

For rivets at joint $\mathbf{B} = \dfrac{n \times a}{p \times t} \times 85$ where steel rivets are used.

$\mathbf{B} = \dfrac{n \times a}{p \times t} \times 70$ where iron rivets are used.

where p = pitch of rivets in inches.

t = thickness of plate in inches.

d = diameter of rivet holes in inches.

n = number of rivets used per pitch in the longitudinal joint.

a = sectional area of rivet in square inches.

In case of rivets in double shear $1{\cdot}75a$ is to be used instead of a.

NOTE.—The inside butt strap to be at least ¾ of the strength of the longitudinal joint.

NOTE.—For the shell plates of superheaters or steam chests enclosed in the uptakes or exposed to the direct action of the flame, the co-efficients should be ⅔ of those given in the preceding tables.

Proper deductions are to be made for openings in shell.

All manholes in circular shells to be stiffened with compensating rings.

The shell plates under domes in boilers so fitted to be stayed from the top of the dome or otherwise stiffened.

STAYS.

The strength of stays supporting flat surfaces is to be calculated from the smallest part of the stay or fastening, and the strain upon them is not to exceed the following limits, namely :—

Iron Stays.—For stays not exceeding $1\frac{1}{2}$ inches smallest diameter, and for all stays which are welded 6,000 lbs. per square inch ; for unwelded stays above $1\frac{1}{2}$ inches smallest diameter, 7,500 lbs. per square inch.

Steel Stays.—For stays not exceeding $1\frac{1}{2}$ inches smallest diameter, 8,000 lbs. per square inch ; for stays above $1\frac{1}{2}$ inches smallest diameter, 9,000 lbs. per square inch. No steel stays are to be welded.

Stay Tubes.—The stress is not to exceed 7,500 lbs. per square inch.

FLAT PLATES.

The strength of flat plates supported by stays is to be taken from the following formula :—

$$\frac{C \times T^2}{P^2} = \text{working pressure in lbs. per square inch ;}$$

where T = thickness of plate in sixteenths of an inch,

P = greatest pitch in inches,

C = 90 for iron or steel plates $\frac{7}{16}$ thick and under, fitted with screw stays with riveted heads,

C = 100 for iron or steel plates above $\frac{7}{16}$ thick fitted with screw stays with riveted heads,

C = 110 for iron or steel plates $\frac{7}{16}$ thick and under, fitted with stays and nuts,

C = 120 for iron plates above $\frac{7}{16}$ thick, and for steel plates above $\frac{7}{16}$ and under $\frac{9}{16}$ thick, fitted with screw stays and nuts,

C = 135 for steel plates $\frac{9}{16}$ thick and above, fitted with screw stays and nuts,

C = 140 for iron plates fitted with stays with double nuts,

C = 150 for iron plates fitted with stays with double nuts and washers outside the plates, of at least $\frac{1}{3}$ of the pitch in diameter and $\frac{1}{2}$ the thickness of the plates,

C = 160 for iron plates fitted with stays with double nuts and washers riveted to the outside of the plates, of at least $\frac{2}{5}$ of the pitch in diameter and $\frac{1}{2}$ the thickness of the plates,

C = 175 for iron plates fitted with stays with double nuts and washers riveted to the outside of the plates, when the washers are at least $\frac{2}{3}$ of the pitch in diameter and of the same thickness as the plates.

For iron plates fitted with stays with double nuts and doubling strips riveted to the outside of the plates, of the same thickness as the plates, and of a width equal to $\frac{2}{3}$ the distance between the rows of

stays, C may be taken as 175, if P is taken to be the distance between the rows, and 190 when P is taken to be the pitch between the stays in the rows.

For steel plates, other than those for combustion chambers, the values of C may be increased as follows :—

C =	140	increased to	175,
	150	„	185,
	160	„	200,
	175	„	220,
	190	„	240.

If flat plates are strengthened with doubling plates securely riveted to them, having a thickness of not less than $\frac{2}{3}$ of that of the plates, the strength to be taken from

$$\frac{C \times (T + \frac{t}{2})^2}{P^2} = \text{working pressure in lbs. per square inch ;}$$

where t = thickness of doubling plates in sixteenths, and C, T and P are as above.

NOTE.—In the case of front plates of boilers in the steam space, these numbers should be reduced 20 per cent., unless the plates are guarded from the direct action of the heat.

For steel tube plates in the nest of tubes the strength to be taken from

$$\frac{140 \times T^2}{P^2} = \text{working pressure in lbs. per square inch ;}$$

where T = the thickness of the plates in sixteenths of an inch,
P = the *mean* pitch of stay tubes from centre to centre.

For the wide water spaces between the nests of tubes the strength to be taken from

$$\frac{C \times T^2}{P^2} = \text{working pressure in lbs. per square inch ;}$$

where P = the horizontal distance from centre to centre of the bounding rows of tubes, and
C = 120 where the stay tubes are pitched with two plain tubes between them and are not fitted with nuts outside the plates,
C = 130 if they are fitted with nuts outside the plates,
C = 140 if each alternate tube is a stay tube not fitted with nuts,
C = 150 if they are fitted with nuts outside the plates,
C = 160 if every tube in these rows is a stay tube and not fitted with nuts,
C = 170 if every tube in these rows is a stay tube and each alternate stay tube is fitted with nuts outside the plates.

The thickness of tube plates of Combustion Chambers in cases where the pressure on the top of the chambers is borne by these plates is not to be less than that given by the following rule :—

$$T = \frac{P \times W \times D}{1600 \times (D - d)}$$

where P = working pressure in lbs. per square inch.
W = width of Combustion Chamber over plates in inches.
D = horizontal pitch of tubes in inches.
d = inside diameter of plain tubes in inches.
T = thickness of tube plates in sixteenths of an inch.

GIRDERS.

The strength of girders supporting the tops of combustion chambers and other flat surfaces to be taken from the following formula :—

$$\frac{C \times d^2 \times T}{(L - P) \times D \times L} = \text{working pressure in lbs. per square inch ;}$$

where L = width between tube plates, or tube plate and back plate of chamber,

P = pitch of stays in girders,

D = distance from centre to centre of girders,

d = depth of girder at centre,

T = thickness of girder at centre. All these dimensions to be taken in inches.

Wrought Iron.

$$C = \begin{cases} 6{,}000, \text{ if there is one stay to each girder.} \\ 9{,}000, \text{ if there are two or three stays to each girder.} \\ 10{,}000, \text{ if there are four or five stays to each girder.} \\ 10{,}500, \text{ if there are six or seven stays to each girder.} \\ 10{,}800, \text{ if there are eight stays or above to each girde} \end{cases}$$

Wrought Steel.

$$C = \begin{cases} 6{,}600, \text{ if there is one stay to each girder.} \\ 9{,}900, \text{ if there are two or three stays to each girder.} \\ 11{,}000, \text{ if there are four or five stays to each girder.} \\ 11{,}550, \text{ if there are six or seven stays to each girder.} \\ 11{,}880, \text{ if there are eight stays or above to each girder.} \end{cases}$$

CIRCULAR FURNACES.

The strength of plain furnaces to resist collapsing to be calculated from the following formula :—

$$\frac{89{,}600 \times T^2}{L \times D} = \text{working pressure in lbs. per square inch ;}$$

where T = thickness of plates in inches,

D = outside diameter of furnace in inches,

L = length of furnace in feet. If strengthening rings are fitted, the length between the rings is to be taken.

If the plates do not exceed $\frac{9}{16}$ inch in thickness, the pressure, however, is not to exceed

$$\frac{8{,}000 \times T}{D} = \text{lbs. per square inch.}$$

If the plates are of steel and exceed $\frac{9}{16}$ inch in thickness, the pressure is not to exceed

$$\frac{8,800 \times \mathbf{T}}{\mathbf{D}} = \text{lbs. per square inch.}$$

In the furnaces referred to below the formulæ given are applicable if the steel used has a tensile strength of not less than 26 nor more than 30 tons per square inch. If the material of furnaces has a less tensile strength than 26 tons per square inch, then for each ton per square inch which the minimum tensile strength falls below 26, the co-efficient is to be correspondingly decreased by $\frac{1}{26}$th part.

If the furnaces are fitted with a single Adamson ring at about the middle of their length, the pressure may be calculated from

$$\frac{10,400 \times \mathbf{T}}{\mathbf{D}} = \text{working pressure in lbs. per square inch.}$$

If the furnaces are fitted with two Adamson rings, then the pressure may be calculated from

$$\frac{11,400 \times \mathbf{T}}{\mathbf{D}} = \text{working pressure in lbs. per square inch.}$$

If the furnaces are fitted with a series of Adamson rings at intervals not exceeding 23 inches, the pressure may be calculated from

$$\frac{1,000 \times (T-2)}{\mathbf{D}} = \text{working pressure in lbs. per square inch ;}$$

where T = thickness of plates in sixteenths of an inch,

D = outside diameter of furnaces in inches.

The strength of corrugated furnaces made of steel, on Fox's or Morison's plan, to be calculated from

$$\frac{1,259 \times (T-2)}{\mathbf{D}} = \text{working pressure in lbs. per square inch.}$$

The strength of ribbed furnaces (with ribs 9 inches apart), to be calculated from the following formula :—

$$\frac{1,160 \times (T-2)}{\mathbf{D}} = \text{working pressure in lbs. per square inch.}$$

The strength of spirally corrugated furnaces is to be calculated from the following formula :—

$$\frac{912 \times (T-2)}{\mathbf{D}} = \text{working pressure in lbs. per square inch ;}$$

where T = thickness of plate in sixteenths of an inch,

and **D** = outside diameter of corrugated furnaces or outside diameter of the plain part of ribbed furnaces in inches.

The strength of Holmes' patent furnaces, in which the corrugations are not more than 16 inches apart from centre to centre, and not less than 2 inches high, to be calculated from the following formula :—

$$\text{Working pressure in lbs. per square inch} = \frac{945 \times (T-2)}{\mathbf{D}}$$

where T = thickness of plain portions of furnace in sixteenths of an inch,

D = outside diameter of plain parts of the furnace in inches.

DONKEY BOILERS.

The iron used in the construction of the fire boxes, uptakes, and water tubes of donkey boilers shall be of good quality, and to the satisfaction of the Surveyors, who may in any cases where they deem it advisable apply the following tests :—

Thickness of Plates.	To Bend cold through an angle of	
	With the Grain.	Across the Grain.
$\frac{5}{16}$	80°	45°
$\frac{6}{16}$	70°	35°
$\frac{7}{16}$	55°	25°
$\frac{8}{16}$	40°	20°

The material to stand bending *hot* to an angle of 90 degrees, over a radius not greater than $1\frac{1}{2}$ times the thickness of the plates.

RULES FOR DETERMINING SIZES OF SHAFTS.

41. The diameters of crank and straight shafts are to be not less than those given by the following formula :—

For Compound Engines with two cranks at right angles—

$$\text{Diameter of crank shaft in inches} = (\cdot04\,\mathbf{A} + \cdot006\,\mathbf{D} + \cdot02\,\mathbf{S}) \times \sqrt[3]{\mathbf{P}}$$

For Triple expansion engines with three cranks at equal angles—

$$\text{Diameter of crank shaft in inches} = (\cdot038\,\mathbf{A} + \cdot009\,\mathbf{B} + \cdot002\,\mathbf{D} + \cdot0165\,\mathbf{S}) \times \sqrt[3]{\mathbf{P}}$$

For Quadruple expansion engines with two cranks at right angles—

$$\text{Diameter of crank shaft in inches} = (\cdot034\,\mathbf{A} + \cdot011\,\mathbf{B} + \cdot004\,\mathbf{C} + \cdot0014\,\mathbf{D} + \cdot016\,\mathbf{S}) \times \sqrt[3]{\mathbf{P}}$$

For Quadruple expansion engines with three cranks—

$$\text{Diameter of crank shaft in inches} = (\cdot028\,\mathbf{A} + \cdot014\,\mathbf{B} + \cdot006\,\mathbf{C} + \cdot0017\,\mathbf{D} + \cdot015\,\mathbf{S}) \times \sqrt[3]{\mathbf{P}}$$

For Quadruple expansion engines with four cranks—

$$\text{Diameter of crank shaft in inches} = (\cdot033\,\mathbf{A} + \cdot01\,\mathbf{B} + \cdot004\,\mathbf{C} + \cdot0013\,\mathbf{D} + \cdot0155\,\mathbf{S}) \times \sqrt[3]{\mathbf{P}}$$

where $\mathbf{A}$ = diameter of High Pressure Cylinder in inches,

$\mathbf{B}$ = diameter of first Intermediate Cylinder in inches,

$\mathbf{C}$ = diameter of second Intermediate Cylinder in inches,

$\mathbf{D}$ = diameter of Low Pressure Cylinder in inches,

S = Stroke of Pistons in inches,

P = Boiler pressure above atmosphere in lbs. per square inch.

The screw shaft to be the same diameter as is required for the crank shaft.

Intermediate shafting should be at least $\frac{1}{2}\frac{9}{0}$ths of the diameter required for the crank shaft.

NOTE.—The Rules are intended to apply to Two Cylinder Compound Engines, in which the ratio of areas of Low and High Pressure Cylinders does not exceed 4·5 to 1 ; to Triple Expansion Engines in which it does not exceed 9 to 1 ; to Quadruple Expansion Engines in which it does not exceed 12 to 1 ; and in all cases, as regards the stroke, in which the length of stroke is not less than one half the diameter or greater than the diameter of the Low Pressure Cylinder. Engines of extreme proportions beyond these limits being specially submitted to be dealt with on their merits.

PERIODICAL SURVEYS. (*See* N.B.)

42. The machinery and boilers of all steam ships are to be surveyed annually if practicable, and in addition are to be submitted to a Special Survey upon the occasions of the vessels undergoing the Special periodical Surveys Nos. 1, 2, and 3, prescribed in the Rules, unless the machinery and boilers have been specially surveyed within a period of twelve months.

43. At these Special Surveys, and on other occasions if deemed necessary by the Surveyors, the propeller, stern-bush, and fastenings of the sea connections, are to be examined while the vessel is in dry dock.

44. The stern shaft is to be drawn and examined, unless it has been surveyed within a period of twelve months. After the propeller shaft is four years old it is to be subject to re-survey at intervals of not more than two years.*

45. The cylinders, pistons, slide valves, crank shaft, and pumps are to be examined, and if necessary the condenser is to be examined and tested.

46. The sea connections and arrangements of cocks, pipes, bilge-suctions, roses, &c., are to be examined.

47. The boilers and superheaters are to be examined internally and externally, and if deemed necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure ; the safe working pressure is to be determined by their actual condition.

48. The safety valves are to be examined and set to the safe working pressure.

49. If satisfactory, these Surveys will be recorded in the Register Book thus :—" LMC9,96 " *in red* or " B&MS9,96 " *in red.*

50. " LMC " (LLOYD'S MACHINERY CERTIFICATE) denotes that the machinery and boilers are fitted in accordance with the Rules ; and when followed by a date, indicates that they were found at that time to be in good condition. MS. with a date denotes that the engines at that time were found upon inspection to be in good condition. BS. with a date denotes that the boilers were found upon inspection at that time to be in good condition.

51. " B&MS " (BOILERS AND MACHINERY SURVEYED), with a date, denotes that the boilers and machinery, though not fitted strictly in accordance with the Rules, were found upon inspection at that time to be in good condition.

* On the application of owners, the Committee will be prepared to give consideration to the circumstances of any special case.

52. In the event of either the machinery or boilers appearing to be impaired to such an extent as to render it desirable that either or both be specially surveyed within the periods prescribed above, a Certificate for either machinery or boilers for a limited period will be granted according to the nature of the case.

BOILERS.

53. The boilers of all steam ships are to be specially surveyed when six years old, and subsequently they are to be specially surveyed annually.

54. At these surveys the boilers and superheaters are to be examined internally and externally, and if deemed necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure; the safe working pressure is to be determined by their actual condition.

55. The safety valves are to be examined and set to the safe working pressure.

56. If satisfactory, these surveys will be recorded in the Register Book thus: "BS9,96" *in red.*

57. "BS" (Boilers Surveyed), with a date, denotes that the boilers were found upon inspection at that time to be in good condition.

58. In the event of the boilers appearing to be impaired to such an extent as to render it desirabe that they be specially surveyed within the periods prescribed above, a Certificate for a limited period will be granted according to the nature of the case.

NB.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

By order of the Committee,

A. G. DRYHURST,

Secretary.

2, White Lion Court, Cornhill, London, E.C.

12th December, 1895.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

NOTICE No. 438.*

BOILERS MADE OF STEEL.

NOTICE is hereby given, that the Committee of this Society have this day passed the following resolutions amending Notice 397 in regard to boilers made of steel:—

1. The use of steel will be sanctioned in the construction of boilers intended for vessels classed or proposed for classification in the Society's Register Book, provided the boilers be constructed in accordance with the requirements of the Rules, and the following conditions be fulfilled.

2. The material is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section,* with an ultimate elongation of not less than 20 per cent. in a length of eight inches. It is to be capable of being bent to a curve of which the inner radius is not greater than one and half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red and quenched in water of 82° Fahrenheit.

Steel rivets are to be considered as part of the material, and in addition to be subjected to a shearing test, they must be capable of withstanding the same tests as the plates are required to undergo.

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented.† In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the furnaces and combustion chambers of the boilers.

4. The Society's Surveyor will attend at the steel works when necessary, and select the samples for testing before the plates are sheared to size, and these samples when marked by him for testing should, as far as practicable, be followed by the Surveyor through the different stages of preparation until the tests are completed.

5. The Society's Surveyor will require to have every facility placed in his way for tracing all plates to their respective charges and to be furnished with two copies of the advice notes of the material, one of which, when he shall have been satisfied with the results of the test applied to the material, is to be signed and forwarded to the boiler manufacturer, and the other to be retained by himself.

6. The samples are taken for testing in order that the general quality of the material may be ascertained, and if any sample should fail to fulfil the conditions laid down, the plate from which the sample is taken must be rejected; and further tests should be made before any material, made from the same cast or charge as the failing sample, can be approved.

7. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.

8. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.

9. No steel stays are to be welded.

10. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

By order of the Committee,

BERNARD WAYMOUTH,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.
19th May, 1881.

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyor should represent the facts for the Committee's consideration.

† When a great number of charges are represented in the number of plates submitted, a proportion of one tensile and one temper test to every ten plates will be deemed sufficient, providing they all prove to be satisfactory.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

USE OF ELECTRIC LIGHT ON BOARD VESSELS.

The following requirements as to the sizes, positions, and protection of the cables, and to the fitting of the cut-outs are now embodied as Rules.

LEADS OR CIRCUITS.

1. The sectional area of the copper wires in the cables should be at least in the proportion of one square inch per 1,000 ampères carried.

2. No single wire of greater size than 14 or of less than 18 standard wire gauge should be used. For portable leads cables composed of stranded wires should be used having sufficient conductivity and flexibility for the purposes intended.

3. The copper used in all wires or cables should have a conductivity of at least 98 per cent. that of pure copper.

4. The insulation resistance of all wires, including portable leads, should be not less than 600 megohms per statute mile, after 24 hours immersion in sea water.

5. The insulating material used must not appreciably soften if subjected to a temperature of 180° F. If india-rubber insulation is used, the wires should be first covered with a layer of pure rubber, then with a separator, then with a layer of vulcanizing india-rubber, and then with a layer of india-rubber coated tape. The whole should then be vulcanized together. The cable should afterwards be satisfactorily protected, preferably with a braided covering of waterproof fibre.

6. Wires which are insulated with any other material than india-rubber should fulfil the same conditions as to insulation resistance, and should be of equal durability with those above specified.

JOINTS.

7. Joints in branches, or of branches with leads of small circuits, must be made in properly constructed water-tight junction boxes, or should have the copper wires thoroughly soldered and the insulation carefully carried out, all the joints being made water-tight. Joints in flow and return wires should not be made opposite one another. All joints should be in accessible positions, none being made in bunkers, cargo spaces, or spaces which may at any time be used for carrying cargo, stores or baggage.

8. For soldering wires, resin only should be used as a flux.

9. Where practicable, the leads should be placed where they can always be accessible; if they are laid in wood battens the covers should be screwed on, not nailed, and care should be taken that the casings are so arranged that water will not lodge in them. Cables which are properly covered with protective metal sheathing, or which are protected by galvanized wire armouring, may be unencased. They should, however, be secured by screwed clips, not by staples. All sharp bends in cables should be avoided.

10. All cables which are liable to be exposed to the weather or moisture should be lead covered, or be otherwise specially protected. Where great heat is experienced, no wood casing should be used, but the cables should be protected by iron casings, or if they are not exposed to mechanical injury, they may be armoured with galvanized wire and fastened to decks or bulkheads with screwed clips spaced not more than 12 inches apart.

11. If cables are led through cargo spaces, coal bunkers, or spaces which may at any time be used for carrying cargo, stores, or baggage, or which are not at all times accessible, they should be strongly protected against damage, preferably by iron casings. If they are led through metal tubes, these must be strongly secured, and should be fitted so that water cannot lodge in them.

12. Where cables pass through beams, bulkheads, or other iron work, they should be led through special fittings of sheet lead, hard wood or vulcanized fibre to prevent their being chafed, and where they pass through decks they should be led through metal tubes lined with wood, or vulcanized fibre, and securely fastened to the decks, standing at such a height above the deck level that water cannot stand above them. Where cables pass through watertight bulkheads the fittings should be provided with brass water-tight screwed glands.

13. In vessels having spaces allotted alternately for passengers and cargo, the lamp fittings in these spaces should be removable, and the terminals so arranged that they can be properly covered up with strong metal covers, or the whole of the fittings should be similarly provided with strong metal covers. The main switches and cut-outs should be outside these spaces, or if placed inside, they should be in strong iron boxes provided with iron covers, or otherwise securely arranged to prevent the fittings being tampered with.

DISTRIBUTION.

14. A main switchboard should be fitted in the dynamo room, to which all the main circuits throughout the ship should be brought, a switch and cut-out being fitted thereon for each circuit. The auxiliary switchboards for further sub-division of the current should be placed in conveniently accessible positions, and each such switchboard should be similarly fitted with a separate switch and cut-out for each small circuit. If vessels are wired on the double-wire system cut-outs should be fitted to each wire of all circuits, including lamp circuits.

15. In cases where electric lights are used for the mast-head light and side lights, the switches controlling these lights should be placed in a position where they can be controlled by the Officer of the watch, or other responsible person, and cannot be tampered with by other members of the crew, or by passengers, &c.

16. The switchboards should be of slate or other incombustible material. The switches should be on the quick break principle, and should be so constructed that they must be either full "on" or completely "off," that is, they must not be able to remain in an intermediate position. They should have ample rubbing surfaces and their conductivity should not be less than that of the wires connected to them.

17. Cut-outs should be fitted to each main or auxiliary circuit, on the switchboards, as near as possible to the switches of these circuits. If the switchboard is not fitted near the dynamo, or if more

than one dynamo may be used on any one circuit, then cut-outs should also be fitted to the main cable as near as possible to each of the dynamo terminals.

18. All other cut-outs should also be in easily accessible places, and as near as possible to the commencement of the cables or wires they protect. They should be mounted on slate or other incombustible bases and be arranged so that the fused metal may not be a source of danger, and where fitted with covers these should be incombustible.

19. All fuses should be of easily fusible and non-oxidizable metal, and should be so proportioned as to melt with a current 100 per cent. in excess of the normal current, that is they should melt with a current in the proportion of 2,000 ampères per square inch of section of the wires they protect. The fuses for branch wires to single lights should, however, if of tin wire, be of not greater size than 22 s.w.g.

20. The fuses for each cable should be made of standard dimensions, so that a large fuse cannot be used for a small cable by mistake, or, if wire fuses are used, permanent instructions should be fitted on or near each switchboard giving particulars of the proper size of fuse for each circuit.

21. In shaft passages and in damp places, all lamp switches and cut-outs should be of a strong water-tight pattern, or should be placed in water-tight boxes having hinged or portable water-tight covers. No switches or cut-outs are to be placed in bunkers.

22. There should be no joints in the cables leading from the dynamo to the main switchboard, nor in those leading from the main to auxiliary switchboards, nor should branches to single lamps be taken off these cables.

23. A voltmeter should be supplied with each installation. If more than one dynamo is fitted neither being capable of the whole of the output, an ampère meter should be supplied with each dynamo.

JOINTS WITH HULL.

24. In vessels fitted on the single-wire system, all the joints with the hull should be placed in accessible positions. Those for single lamps or for small cables should be made with brass screws not less than three-eighths of an inch in diameter, carefully tapped into the iron or steel, having white brass washers, between the wires and the vessel, or the wires should be soldered to brass faced washers. For larger cables and for the pole of dynamo the cable wires should be properly sweated into brass or copper shoes, which should be bolted to the vessel. The iron or steel where contact is made should be filed bright, and the area of contact should not be less than eight times the section of the copper of the cable.

IN VESSELS CARRYING PETROLEUM.

25. The single wire system must not be adopted for any part of the installation. Switches and cut-outs must not be fitted in places liable to the accumulation of petroleum vapour or gas, and all lamps in places where it is possible for gas to accumulate must be made with an outer glass globe made air tight. All wires in such places are to be lead covered, or the insulation of the cables employed is to be of such a nature as not to be affected by petroleum. No joints of cables, switches, or cut-outs should be fitted in the pump room, but the wires for each lamp therein should be carried to the lamp from a distributing junction box placed outside the pump room or companion.

The following paragraphs referring to the effect of the Electric Light installations upon the Compasses are issued as suggestions, not as Rules.

POSITION OF DYNAMOS AND OF ELECTRIC MOTORS.

26. The position and type of Dynamos and Electric Motors should be such that the compasses will not be affected. Dynamos and large motors should be at least 30 feet from the standard compass.

CABLES.

27. In vessels fitted with continuous current dynamos, and wired on the single-wire system, no single cable should be carried within 15 feet of any compass, and cables conveying heavy currents should be fixed at still greater distance. If it is necessary to fix any cables within this distance, then for all parts of the vessel lighted from this cable the concentric or double-wire system should be adopted, the return wire being carried as near the flow as possible in the vicinity of the compasses.

ADJUSTMENT OF COMPASSES.

28. The compasses should be adjusted with the dynamo not working, after which the vessel's head should be put upon the different courses, with the dynamo running at full speed, and on each course the indications of the compass should be noted with the dynamo running with open circuit and with all possible combinations of the current switched "on" and "off" all circuits passing near the compasses. These indications should be compared with those obtained with the dynamo stopped, and any serious deflections of the compasses remedied before the vessel sails.

The requirements in paragraphs 3 to 8 inclusive, referring to the quality of the material used, or to the workmanship employed, are embodied as rules; but as the quality of the material can only be tested at the Cable Makers' works, and as the workmanship of the joints cannot be examined or tested after completion, the guarantee of the Electrical Engineers will be required as to these points.

By order of the Committee,

A. G. DRYHURST,

Secretary.

2, White Lion Court, Cornhill, London, E.C.,

20th December, 1894.

EXTRACTS FROM THE RULES

OF THE LATE

UNDERWRITERS' REGISTRY FOR IRON VESSELS (for 1884-85)

(NOW UNITED WITH LLOYD'S REGISTER OF SHIPPING),

SHOWING THE CONDITIONS OF CLASSIFICATION, &c.

REVISION OF CERTIFICATE OR SUSPENSION OF CLASS.

The certificate of class will remain good so long as the vessel, under periodical survey, is found worthy of it. In case of defects reported by the Surveyors not being made good, the class of the vessel will be revised or suspended by the Committee.

REFERENCE IN CASE OF COMPLAINT.

Any dispute shall be referred to three Shipbuilders or Engineers, one to be chosen by the Shipowner, one to be chosen by this Committee, and a third to act as umpire, to be chosen by the other two.

SURVEY FEES.

For surveying vessels periodically to ascertain condition, first visit	£1	1	0
For each succeeding visit, when more than one visit is necessary	0	10	6

For special surveys special charges will be made, subject to the control of the Committee.

PERIODICAL SURVEYS.

A thorough survey will be required once in every four years for vessels with an A1* or an A1* certificate; and once in every three years for vessels with an A1, A 1, A or an A certificate When vessels are abroad at the time they become due for survey, they must be examined on their return to the United Kingdom. The Surveyors are at all times to have free access to examine vessels holding a class in this Registry.

Vessels due for Periodical Survey which leave the United Kingdom without being duly surveyed and passed by the Surveyors to this Registry will have their class suspended until such survey has been properly made. Notice of Suspension of Class will be given in the first Supplement issued after the sailing of the vessel.

Vessels remaining abroad for two years after they become due for Periodical Survey will have their Class suspended until they have been re-surveyed

First Survey.

The vessel to be placed in dry dock. (The bottom may be cleaned, but should not be recoated before survey.) While in dry dock the rudder, rudder pins and gudgeons, and the whole of the bottom outside, are to be thoroughly examined, and in steamers the connections of the sea-cocks and openings in the bottom are to be examined, to see that they are in an efficient condition.

The holds, and, in steamers, the bunkers also, are to be cleared, the loose ceiling in the flat of bottom is to be lifted, and the Surveyor is to satisfy himself that the bottom inside is in good order, and that the cement is in good condition and satisfactorily adhering to the iron.

He is also to examine the decks, beam ends, and the sides of holds and 'tween decks, all fore and aft. In steamers the bilges and limbers under engines and boilers are to be cleaned out, so as to allow these darts to be examined by the Surveyor. In water-ballast steamers the tanks are to be examined externally, and, if the Surveyor deems it necessary, they are to be tested under the pressure due to the ballast-trim water-line, and sufficient ceiling removed to enable the Surveyor to satisfy himself of their tightness. In all cases the tanks are to be emptied, and examined inside. In all vessels any repairs that may be needed are to be done, and the vessel cleaned and painted as may be necessary.

Second Survey.

The vessel to be submitted to the same survey as before described for "First Survey," with the following additions:—

A strake of ceiling must be lifted in the bilges to allow an examination of the condition of the iron surfaces there and of the cement.

The windlass must be unhung when the main piece is of wood; and the chain cables must be ranged out for examination. In steamers the water ballast tanks must be tested under the pressure due to ballast-trim water-line.

Third Survey.

The vessel to be submitted to the same survey as before described for "First Survey," with the following additions:—

The whole of the close ceiling must be removed, and all the cement exposed and examined. The vessel must be cleaned and scaled, and, if the Surveyor deems it necessary, the plating and other parts must be drilled as he may direct, to ascertain the thickness. In steamers the water ballast tanks must be tested under the pressure due to ballast-trim water line.

Fourth Survey.

The vessel to be submitted to the same survey as before described for "First Survey," with the following additions:—

The windlass, if the main piece is of wood, must be unhung, and the chain cables ranged out for examination. In steamers the water ballast tanks must be tested under the pressure due to the ballast-trim water line.

Fifth Survey.

The vessel must be submitted to the same survey as before described for "Second Survey."

Sixth Survey or Special Survey.

The vessel must be submitted to the same survey as before described for "Third Survey," with the following additions :—

The actual condition and thickness of all the scantlings must be ascertained, the shell plating being drilled on at least three vertical lines in each strake, viz., forward, amidships, and aft, and elsewhere, at the discretion of the Surveyor, as he may direct.

A report of the vessel's condition and scantlings is to be submitted to the Committee, and such part or parts as they may direct are to be renewed, or otherwise strengthened.

After a vessel has passed her sixth survey, and been approved by the Committee, she must be submitted to the same series of surveys, commencing with the "First Survey," and at the same periodical intervals as before.

In steamers, whenever the engines or boilers are removed, a survey is to be held on the vessel's bottom in way thereof, and such repairs as are necessary must be effected before the engines or boilers are replaced.

The preceding rules for periodical surveys are not to limit the Surveyor's discretion, if, in his judgment, it is necessary to make a more complete examination at any time ; and, before completing the report, the Surveyor must, at every periodical survey, satisfy himself that the vessel and her equipment are in a good and efficient condition.

The "Third Survey" must be complied with before the expiration of thirteen years from the date of launch for vessels with an A1* or **A1*** certificate, ten years for vessels with an A1 or **A1** certificate, and nine years for vessels with an A or **A** certificate; and the "Sixth Survey" before the expiration of twenty-six years from the date of launch for vessels with an A1* or **A1*** certificate, twenty years for vessels with an A1 or **A1** certificate, and eighteen years for vessels with an A or **A** certificate.

Lloyd's Register of British and Foreign Shipping,
2, White Lion Court, Cornhill, E.C.
1st September, 1885.

EXTRACTS FROM THE RULES of the late UNDERWRITERS' REGISTRY FOR IRON VESSELS (for 1884-85)

(NOW UNITED WITH LLOYD'S REGISTER OF SHIPPING).

EQUIPMENT FOR STEAM VESSELS.

Section 29.—The equipment of Anchors and Chain Cables and Hawsers to be in accordance with Table 14 for Steam Vessels (*see below*).

The tonnage regulating equipment is to be the gross register tonnage under upper deck, with the addition of three-tenths of the tonnage of erections above upper deck.

TABLE No. 14.—ANCHORS, CHAINS, AND HAWSERS FOR STEAM VESSELS.

VESSELS TONNAGE. *See Section 29.*	Anchors, with either Iron or Wood Stocks.								Stud-chain Cables.			Stream Chain.		Hawsers and Warps.				VESSELS TONNAGE. *See Section 29.*
	Number.			Weight.														
				Bowers.														
	Bowers.	Stream.	Kedges.	Without Stock.	Admiralty Test.	Stream.	Kedge.	2d Kedge.	Minimum Size.	Proved to Admiralty Test.	Length.			Tow Rope.	Hawsers.	Warps.	Length.	
Tons. Tons.				Cwt.	Tons.	Cwt.	Cwt.	Cwt.	Inches.	Tons.	Fathoms.	Fath.	Size.	Inches.	Inches.	Inches.	Fath.	Tons. Tons.
100 and under 150	2	1	...	3	4·9	1	...	...	$\frac{11}{16}$	8·1	120	45	$\frac{8}{16}$	$5\frac{1}{2}$	$3\frac{1}{2}$	...	90	100 and under 150
150 „ 188	2	1	1	4	6·4	$1\frac{3}{4}$	1	...	$\frac{13}{16}$	11·9	150	45	$\frac{9}{16}$	6	4	...	90	150 „ 188
188 „ 225	2	1	1	$5\frac{1}{4}$	7·6	2	1	...	$\frac{14}{16}$	13·8	165	45	$\frac{10}{16}$	6	4	...	90	188 „ 225
225 „ 263	2	1	1	6	8·2	$2\frac{1}{2}$	$1\frac{1}{4}$	...	$\frac{15}{16}$	15·8	165	45	$\frac{10}{16}$	$6\frac{1}{2}$	4	...	90	225 „ 263
263 „ 300	2	1	1	$7\frac{1}{4}$	9·5	$2\frac{3}{4}$	$1\frac{1}{4}$	...	1	18	165	45	$\frac{11}{16}$	7	5	...	90	263 „ 300
300 „ 375	3	1	1	$8\frac{1}{4}$	10·4	3	$1\frac{1}{2}$	...	$1\frac{1}{16}$	20·3	165	60	$\frac{11}{16}$	$7\frac{1}{2}$	$5\frac{1}{2}$	...	90	300 „ 375
375 „ 450	3	1	2	10	12·0	$4\frac{3}{4}$	$2\frac{1}{4}$	1	$1\frac{2}{16}$	22·8	195	60	$\frac{12}{16}$	8	6	...	90	375 „ 450
450 „ 525	3	1	2	12	13·9	5	$2\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{3}{16}$	25·4	195	60	$\frac{12}{16}$	$8\frac{1}{2}$	$6\frac{1}{2}$	...	90	450 „ 525
525 „ 600	3	1	2	$13\frac{1}{2}$	15·2	6	3	$1\frac{1}{2}$	$1\frac{4}{16}$	28·1	210	60	$\frac{13}{16}$	9	7	...	90	525 „ 600
600 „ 675	3	1	2	$15\frac{1}{4}$	16·7	$6\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{5}{16}$	31	210	60	$\frac{13}{16}$	$9\frac{1}{2}$	7	4	90	600 „ 675
675 „ 750	3	1	2	$16\frac{3}{4}$	18·0	7	$3\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{6}{16}$	34	240	60	$\frac{14}{16}$	10	8	5	90	675 „ 750
750 „ 900	3	1	2	18	19·0	8	4	2	$1\frac{7}{16}$	37·2	240	60	$\frac{14}{16}$	10	8	5	90	750 „ 900
900 „ 1050	3	1	2	21	21·6	9	$4\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{8}{16}$	40·5	240	75	$\frac{15}{16}$	10	9	$5\frac{1}{2}$	90	900 „ 1050
1050 „ 1200	3	1	2	$23\frac{1}{2}$	23·5	10	5	$2\frac{1}{2}$	$1\frac{9}{16}$	44	270	75	$\frac{15}{16}$	10	9	$5\frac{1}{2}$	90	1050 „ 1200
1200 „ 1350	3	1	2	$25\frac{1}{2}$	25·2	$10\frac{1}{2}$	$5\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{10}{16}$	47·5	270	75	1	10	$9\frac{1}{2}$	6	90	1200 „ 1350
1350 „ 1500	3	1	2	$27\frac{3}{4}$	26·9	11	$5\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{11}{16}$	51·2	270	75	1	10	10	6	90	1350 „ 1500
1500 „ 1800	3	1	2	30	28·6	12	6	3	$1\frac{12}{16}$	55·1	270	75	$1\frac{1}{16}$	11	$10\frac{1}{2}$	$6\frac{1}{2}$	90	1500 „ 1800
1800 „ 2100	3	1	2	32	30·1	13	$6\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{13}{16}$	59·1	270	75	$1\frac{1}{16}$	11	11	7	90	1800 „ 2100
2100 „ 2400	3	1	2	34	31·6	$13\frac{1}{2}$	$6\frac{3}{4}$	$3\frac{1}{4}$	$1\frac{14}{16}$	63·3	270	75	$1\frac{2}{16}$	11	11	7	90	2100 „ 2400
2400 „ 2700	3	1	2	$36\frac{1}{2}$	33·4	14	7	$3\frac{1}{2}$	$1\frac{15}{16}$	67·6	270	90	$1\frac{2}{16}$	12	12	8	90	2400 „ 2700
2700 „ 3000	3	1	2	38	34·5	$14\frac{1}{2}$	$7\frac{1}{4}$	$3\frac{1}{2}$	2	72	270	90	$1\frac{3}{16}$	12	12	8	90	2700 „ 3000
3000 „ 3450	3	1	2	40	35·7	15	$7\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{1}{16}$	76·6	270	90	$1\frac{3}{16}$	12	12	8	90	3000 „ 3450
3450 „ 3900	3	1	2	41	37·0	16	8	$4\frac{1}{4}$	$2\frac{2}{16}$	81·3	300	90	$1\frac{3}{16}$	12	12	8	90	3450 „ 3900
3900 „ 4500	4	1	2	43	38·0	$17\frac{1}{2}$	$8\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{3}{16}$	86·1	300	90	$1\frac{4}{16}$	12	12	9	90	3900 „ 4500
4500 „ 5250	4	1	2	45	39·2	19	$9\frac{1}{2}$	$4\frac{3}{4}$	$2\frac{4}{16}$	91·1	330	90	$1\frac{4}{16}$	12	12	9	90	4500 „ 5250
5250 „ 6000	4	1	2	47	41	21	10	5	$2\frac{5}{16}$	96	330	90	$1\frac{5}{16}$	12	12	9	90	5250 „ 6000

Anchors and Chains to be tested to Admiralty proof. A reduction of 15 per cent. will be allowed in the weight of the Third and Fourth Bower.

Lloyd's Register of British and Foreign Shipping,
2, White Lion Court, Cornhill, London, E.C.—*15th April, 1893.*

No. 647.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CAST STEEL ANCHORS.

NOTICE IS HEREBY GIVEN that the Committee of this Society will hereafter require that all Cast Steel Anchors intended for vessels classed or proposed to be classed in the Society's Register Book shall be subjected, in addition to the statutory tests, to the percussive, hammering, and bending tests recommended in the recent report of the Committee appointed by the Board of Trade to consider the question of tests of Cast Steel Anchors.

These tests, which are hereunder set forth, must be carefully and completely made in the presence and to the satisfaction of officers appointed by the Committee, viz. :—

PERCUSSIVE TEST.

1. Anchors, or when anchors are made of more than one piece, each piece shall be subject to this test, as follows :—

GIVEN WEIGHT.	GIVEN HEIGHT.
15 cwt. and below	- 15 feet.
Above 15 cwt.	- 12 feet.

The anchor or piece shall be raised the given height for the given weight and shall be dropped on an iron slab.

The given height means that the lowest part of the anchor or piece when suspended shall be at least the given height above the iron slab on to which it is to be dropped.

2. An anchor of the Admiralty pattern shall first be raised vertically to the given height with its shanks and arms in a horizontal position, and shall be let fall from that height.

3. It shall then be raised a second time to the given height, and shall be suspended with the crown downwards. Two iron blocks shall be placed underneath it, and it shall be let fall from this position so that one of the blocks receives it on the middle of one arm, and the other block receives it on the middle of the other arm.

4. The slab for the horizontal test shall be of steel or iron, well laid on a solid concrete foundation to the satisfaction of the inspector.

5. If the slab on which the anchor falls is broken, the test shall be repeated until a slab is made that does not break

6. The blocks for the vertical test shall be solid, and shall be of sufficient height to prevent the crown of the anchor from touching the slab, and shall be otherwise to the satisfaction of the inspector.

HAMMERING TEST.

7. When the percussive test has been passed successfully, to the satisfaction of the inspector, the anchor or piece shall be slung and freely put to a hammering test as follows, that is to say, it shall be well hammered over its parts with a sledge hammer weighing not less than 7 lbs., and shall be required to give under this treatment such a clear ring in all its parts as shall satisfy the inspector that the casting is sound, and without flaws existing either originally or developed as the result of the application of the preceding percussive tests.

BENDING TEST

8. Cast steel may be passed as sufficiently ductile for anchors when a piece of each casting, 8 inches in length, is cut from the casting, turned to 1 inch in diameter, and is then bent cold by hammering through an angle of 90 degrees over a radius of $1\frac{1}{2}$ inches, without showing signs of flaw or fracture.

9. There must be a piece cast on each cast steel anchor, or on each portion of such anchor when it is made of more than one casting, and such piece must be of sufficient size to enable one test piece of the size before stated to be cut out of it, or it may be (at the discretion of the manufacturer) of sufficient size to enable four test pieces to be cut out of it. If it is only of sufficient size to enable one test piece to be cut out of it, that piece shall be subjected to the bending test named in paragraph 8, and, if it fails to withstand it, the casting is to be condemned.

If the piece is large enough to enable four test pieces to be cut out of it, these four test pieces shall be disposed of as follows, that is to say, one of them shall be turned in a lathe to 1 inch in diameter for a length of 8 inches, and bent cold through an angle of 90 degrees over a radius of $1\frac{1}{2}$ inches, and if it withstands this test without flaw or fracture, shall be deemed to have withstood a satisfactory test for ductility. If the one test piece does not pass this test, all or any of the other three test pieces may be tested in a similar manner, and if any one of the four tests pieces passes this test, the anchor or part of the anchor, as the case may be, shall be deemed so far satisfactory.

ANNEALING.

10. Each anchor must be properly and sufficiently annealed, and when so annealed, shall be stamped "annealed steel." Annealing is not to be regarded as proper, or efficient, unless the process extends from three days for small anchors, up to six days for large ones.

By order of the Committee,

B. WAYMOUTH,

Secretary.

2, *White Lion Court, Cornhill, London, E.C.*

10*th November*, 1887.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CAST STEEL ANCHORS.

Sir.—The Committee have recently had under consideration a report by the Chief Engineer Surveyor on the several methods of making Steel Castings.

Notwithstanding all the care and precaution that may be taken in forming the moulds, and in the selection of the material used for the purpose, Steel Castings are not infrequently found with more or less serious cracks or defects, owing generally to the uneven rate of cooling.

With regard to Cast Steel Anchors, and with reference to Circular No. 647 (of which I enclose a copy), I am directed to request that you will, in future, examine the Castings of all parts of Steel Anchors intended for Ships classed or proposed to be classed in the Society's Register Book, *before* they are annealed.

You will then be better able to observe any defects which may exist, the skin or scale put on by annealing, rendering it more difficult to detect cracks or other defects, particularly when such cracks or defects have been carefully hammered up and closed.

If on examination any such cracks or defects are observed, the Anchor should not be tested or passed; but if the defects appear to be on the surface only and can be entirely cut out without damaging the Anchor, this may be done in your presence; you must however satisfy yourself that they are entirely removed before you proceed with the tests.

I am, Sir,

Your obedient servant,

HENRY C. SEYFANG, *Secretary*,

Committee on Proving Machines.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

STEEL MANUFACTURERS.

The following firms having applied to have the steel produced by them tested by a Surveyor to this Society and their mode of procedure reported upon, their applications have been complied with and the Surveyors' reports found satisfactory by the Committee.

Firms in the United Kingdom.

Barrow Hæmatite Steel Co. (Lim.), Barrow.
W. Beardmore & Co., Rolling Mills and Steel Works, Parkhead, Glasgow.
Bolckow, Vaughan & Co. (Lim.), Middlesbro'-on-Tees.
Bolton Iron & Steel Co. (Lim.), Bolton, Lancashire.
Bowling Iron Co. (Lim.), Bradford, Yorks.
John Brown & Co. (Lim.), Sheffield.
Brymbo (The) Steel & Ingot Iron Works, near Wrexham. (*For bars only.*)
Butterley Co. (Lim.), Codnor Park, near Alfreton.
Calderbank Steel & Coal Co. (Lim.), Calderbank.
Caledonian Steel Castings Co., Helen Street, Govan, Glasgow.
Charles Cammell & Co. (Lim.), Sheffield.
Clydebridge Steel Co. (Lim.), Rolling Mills and Steel Works, Cambuslang.
Coltness Iron Co. (Lim.), Melting Furnace and Foundry, Newmains, Lanarkshire.
David Colville & Sons (Lim.), Rolling Mills and Steel Works (Dalzell Steel and Iron Works), Motherwell
Consett Iron Co. (Lim.), Blackhill, Durham.
Dorman, Long & Co., (Lim.), Middlesbro'-on-Tees.
Dowlais Iron Works Co., Dowlais.
Frodingham Iron & Steel Co., Frodingham, near Doncaster. (*Sections and Bars.*)
Glasgow Iron & Steel Co. (Lim.), Melting Furnaces at Wishaw, and Rolling Mills at Wishaw and Motherwell.
Glengarnock Iron and Steel Co. (Lim.), Glengarnock, N.B. (*Sections and Bars.*)
Hardie & Gordon, Melting Furnaces and Foundry at Dalreoch, Dumbarton.
P. R. Jackson & Co. (Lim.), Salford Rolling Mills, Manchester.

Lanarkshire Steel Co. (Lim.), Motherwell. *(Bars only.)*

Leeds Forge Co. (Lim.), Leeds.

Lilleshall Co. (Lim.), Offices, Priors Lee Hall, near Shifnal. (*For plates not exceeding half-an-inch.*)

Moor Steel & Iron Co. (Lim.), Stockton-on-Tees.

Nettlefolds (Lim.), Castle Works, Tydu, near Newport, Mon. (*Rivet and Stay bars.*)

New British (The) Iron Co., Corngreaves, near Birmingham.

Palmers' Shipbuilding & Iron Co. (Lim.), Jarrow-on-Tyne.

Park Gate Iron & Steel Co. (Lim.), Rotherham.

Patent (The) Nut & Bolt Co. (Lim.), near Birmingham. (*For rivet bars only.*)

Patent Shaft & Axletree Co. (Lim.), Wednesbury.

John Spencer & Sons, (Lim.), Newburn Steel Works, Newcastle-on-Tyne.

Springfield Steel Co., Melting Furnace and Foundry, 777, London Road, Glasgow.

Steel Company of Scotland (Lim.), Rolling Mills and Steel Works at Newton and Blochairn.

Steel, Peech & Tozer, (Lim.), Sheffield. *(Rivet and Stay bars.)*

Stewart, A. & J., & Clydesdale (Lim.), Rolling Mills and Steel Works, Mossend.

Stockton Malleable Iron Co. (Lim.), Stockton-on-Tees.

Summerlee & Mossend Iron & Steel Co. (Lim.), Rolling Mills and Steel Works at Mossend.

Taylor Bros., Leeds.

Wear Steel Co. (Lim.), Sunderland.

Weardale Iron & Coal Co. (Lim.), Spennymoor.

West Cumberland Iron & Steel Co. (Lim.), Workington.

West Hartlepool Steel & Iron Co., W. Hartlepool.

Wigan Coal & Iron Co. (Lim.), Wigan. (*Sections and Bars.*)

Firms on the Continent.

Aciéries de Grenelle (Mons. E. Plichon), 56, Rue Lourmel, Paris (Steel Foundry).

Aciéries Hauts-Fourneaux & Forges de Trignac, near St. Nazaire.

Angleur Steel Works, near Liège.

Avesta Steel Works, near Stockholm.

Société John Cockerill, Seraing, near Liège.

Compagnie Anonyme des Forges de Chatillon & Commentry, Commentry, France.

Compagnie des Hauts-Fourneaux, Forges et Aciéries de la Marine et des Chemins de Fer, St. Chamond, France.

Degerfors Steel Works, Sweden.

Domnarfvet Steel Works, Sweden.

Donawitz Iron & Steel Works, near Leoben.

Duisberger Eisen und Stahlwerke, Duisberg.

The Espérance Rolling Mills, Longdoz, Liège.

Fonderies, Forges and Aciéries de St. Etienne, St. Etienne, France.

Forges de la Loire et du Midi (Messrs. Marrel Frères), Rive de Gier, France.

Gewerkschaft Deutscher Kaiser (Thyssen & Co.), Bruckhausen, Germany.

Gewerkschaft Grillo, Funke & Co., Schalke, Westfalen.

Gute Hoffnungs Hütte, Oberhausen.

Hauts-Fourneaux, Fonderies Forgeries & Laminoirs De Meurthe & Moselle (Mr. Fould-Dupont), Usines de Pompey, France.

Hörde Steel Works, near Dortmund.

Innerberger Haupt-gewerkschaft.

The Jemeppe Rolling Mills, near Liège.

Kladno Steel Works, Kladno, near Prague.

Kohlswa Jernverks Aktiebolag. Melting Furnaces and Foundry at Kohlswa, Sweden.

Krainische Industrie Gesellschaft, of Assling, Oberkrain.

Krupp's Steel Works at Annen.

Do. do. Essen.

Motala Company, Sweden.

Neuberg Steel Works, Neuberg, Styria.

Oberbilker Stahlwerk, Dusseldorf. Melting Furnaces, Dusseldorf; Rolling Mills at "Dusseldorfer Rohren and Eisen—Walzwerke."

The Phœnix Company at Eschweiler.

Schneider & Co., Creusot.

Société Anonyme des Forges et Fonderies de Montataire, Montataire, France.

Société Anonyme des Hauts-Fourneaux, Fonderies & Forges de Franche-Comté, Fraisans (Jura), France.

Société Anonyme des Hauts-Fourneaux Forges et Aciéries de Denain & D'Anzin, Denain, France (Nord).

Société Anonyme d'Ougrée, near Liège.

Société Anonyme de la Providence, Hautmont, North of France.

Societá Ligure Metallurgia (Lim.), Sestri Ponente, Italy.

Tardy & Benech, Savona.

The Union Iron & Steel Co., Dortmund, Germany.

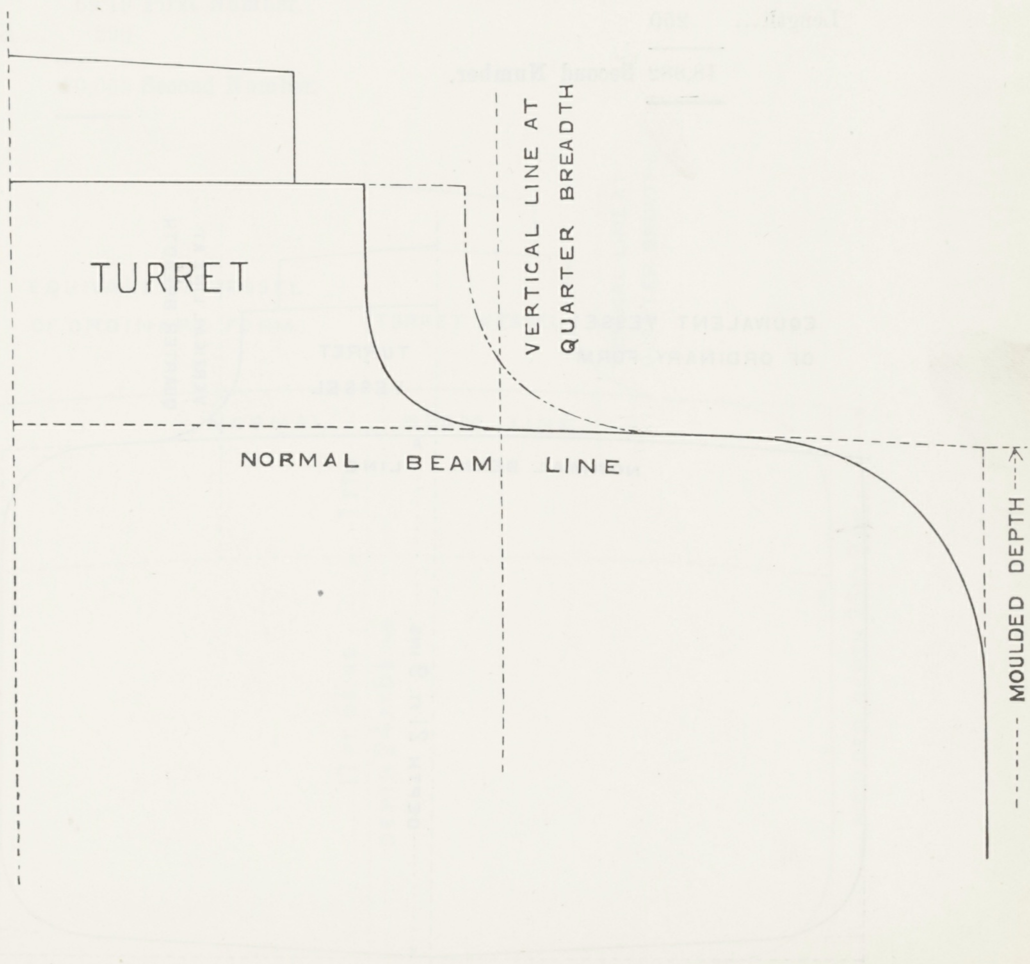
Thyssen & Co., Mulheim, a.d. Ruhr, Germany.

Witkowitz Steel Works, Witkowitz, Mohren.

(Revised April, 1897.)

SKETCH A.

Sketch illustrating method of determining the depth of Turret deck Vessels.



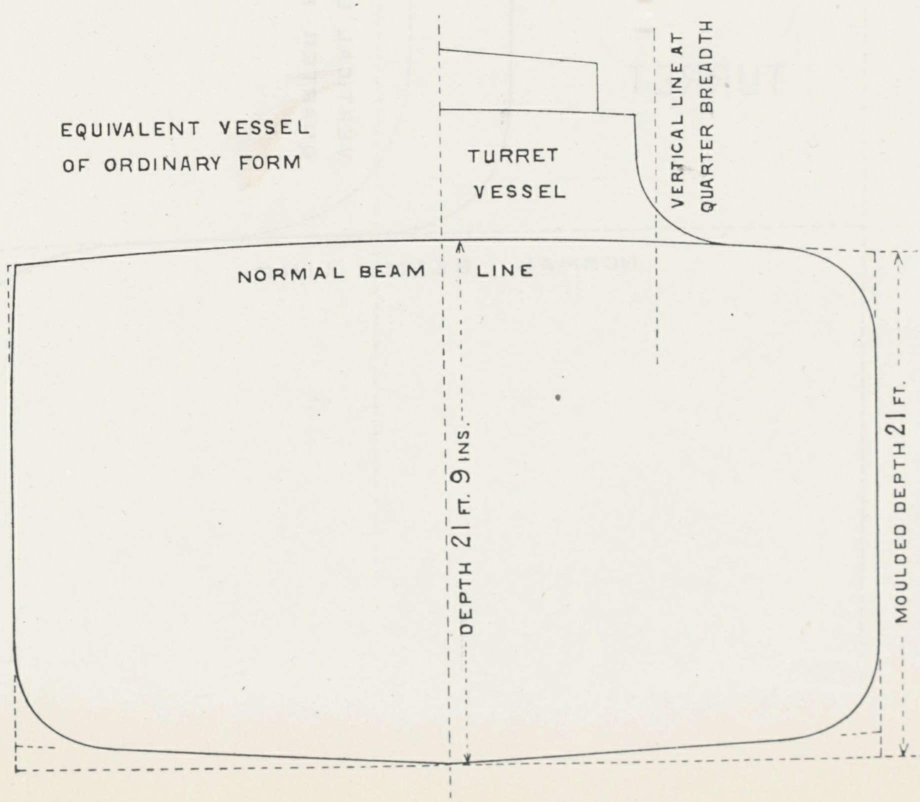
SKETCH SHOWING METHOD OF ESTIMATING THE

Dimensions.

Length (Rule)	... ...	250 ft. 0 ins.
Breadth (Moulded)	... ...	36 „ 0 „
Depth (Do.)	... ...	21 „ 0 „

	FT.	
½ Breadth ...	18·0	
Depth	21·75	
½ Girth	37·0	
	76·75	
Less ...	1·46	Half Standard mean sheer for Length equal to 12 times Moulded [Depth.
	75·29	**First Number.**
Length ...	250	
	18,882	**Second Number.**

Proportions :—Length = 6·9 Breadths.
„ = 11·4 Depths.



SKETCH B.

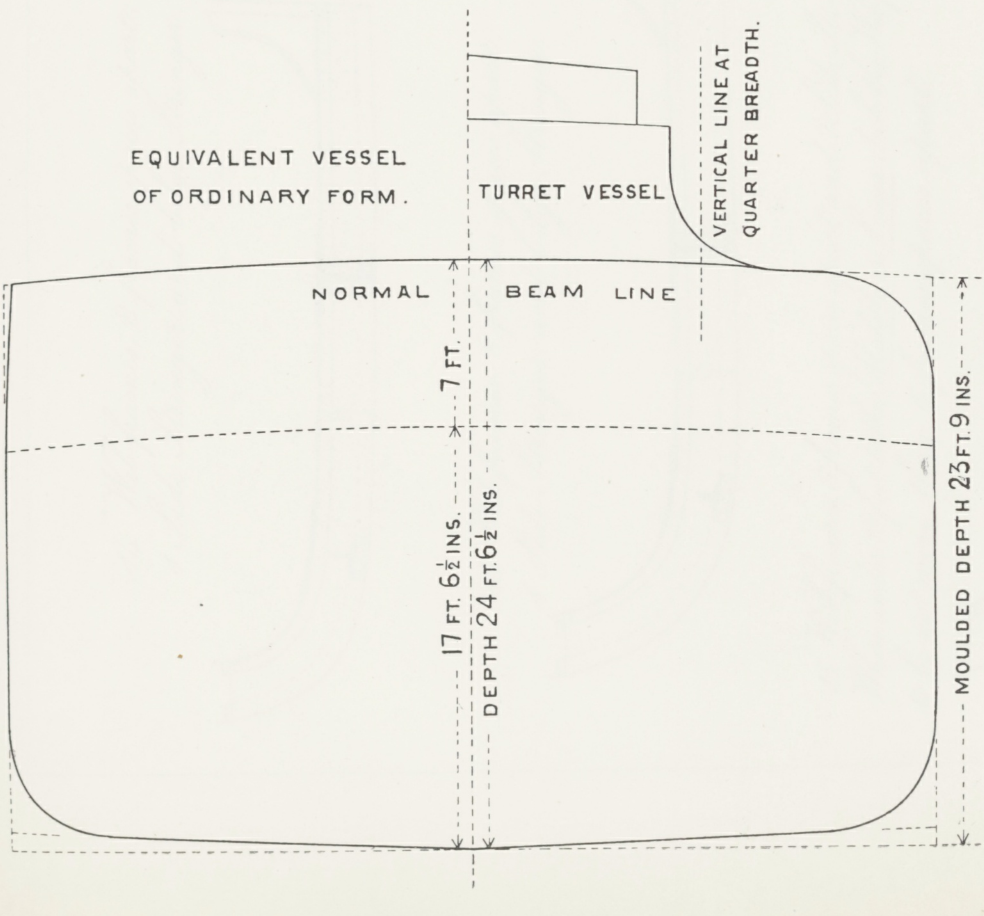
NTLING NUMERALS OF A TURRET DECK VESSEL.

Dimensions.

Length (Rule) ... ... 290 ft. 0 ins.
Breadth (Moulded) ... ... 38 „ 6 „
Depth (Do.) ... ... 23 „ 9 „ to Upper Deck.

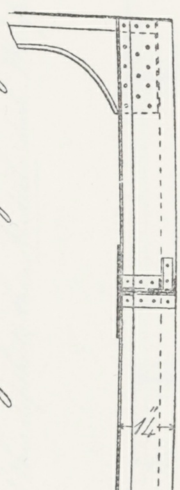
Proportions:—Length = 7·5 Breadths.
„ = 11·8 Depths to Upper Dk. and 16·5 to Main Dk.

	FT.	
½ Breadth ...	19·25	
Depth	17·54	to a point 7 feet below normal beam line at base of Turret.
½ Girth	34·00	„ „ „
	70·79	
Less ...	1·60	Half Standard mean sheer for Length equal 12 times Moulded [Depth.
	69·19	**First Number.**
Length ...	290	
	20,065	**Second Number.**



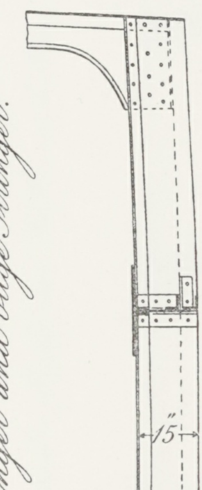
Sketches illustrating the arrangement of Web-Frames and Side Stringers in lieu of Hold Beams, as per Section 14a, paragraphs 9 to 19.

under 16 feet (par 9)



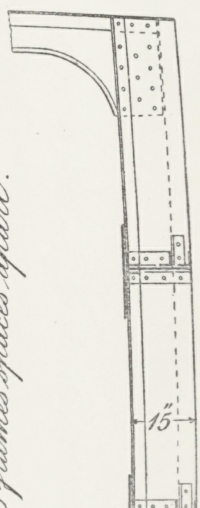
14" Web-frames, 8 frames spaces apart; 1 Side Stringer and bilge Stringer.

16 feet and under 17 feet (par 10)



15" Web-frames, 8 frames spaces apart; 1 Side Stringer and bilge Stringer.

17 feet and under 18 feet (par 11)

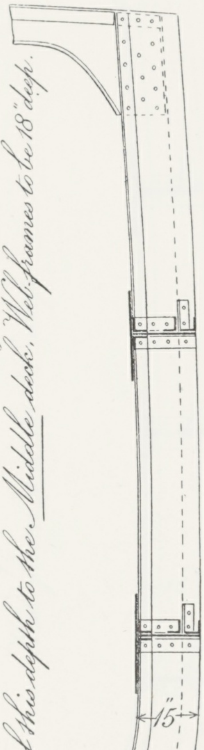


15" Web-frames, 8 frames spaces apart and 2 Side Stringers. When under 18 feet to the Middle or Lower deck the Web-frames to be not more than 6 frames spaces apart.

Web-frames and Side Stringers in lieu of Hold beams. (continued)

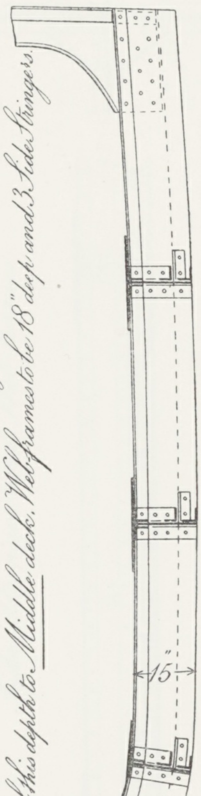
18 feet and under 21½ feet (par 12)

15" Web-frames, 6 frame spaces apart
and 2 Side Stringers.
When of this depth to the *Middle* deck, Web-frames to be 18" deep.

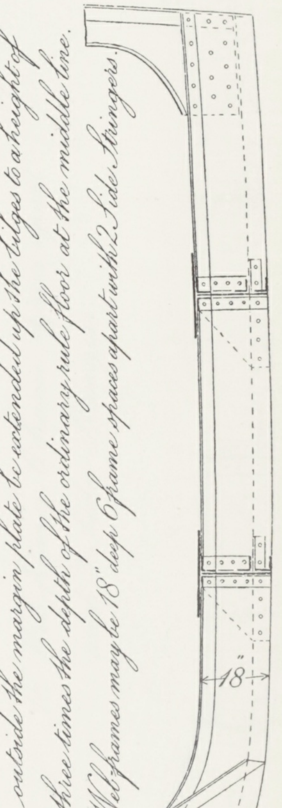


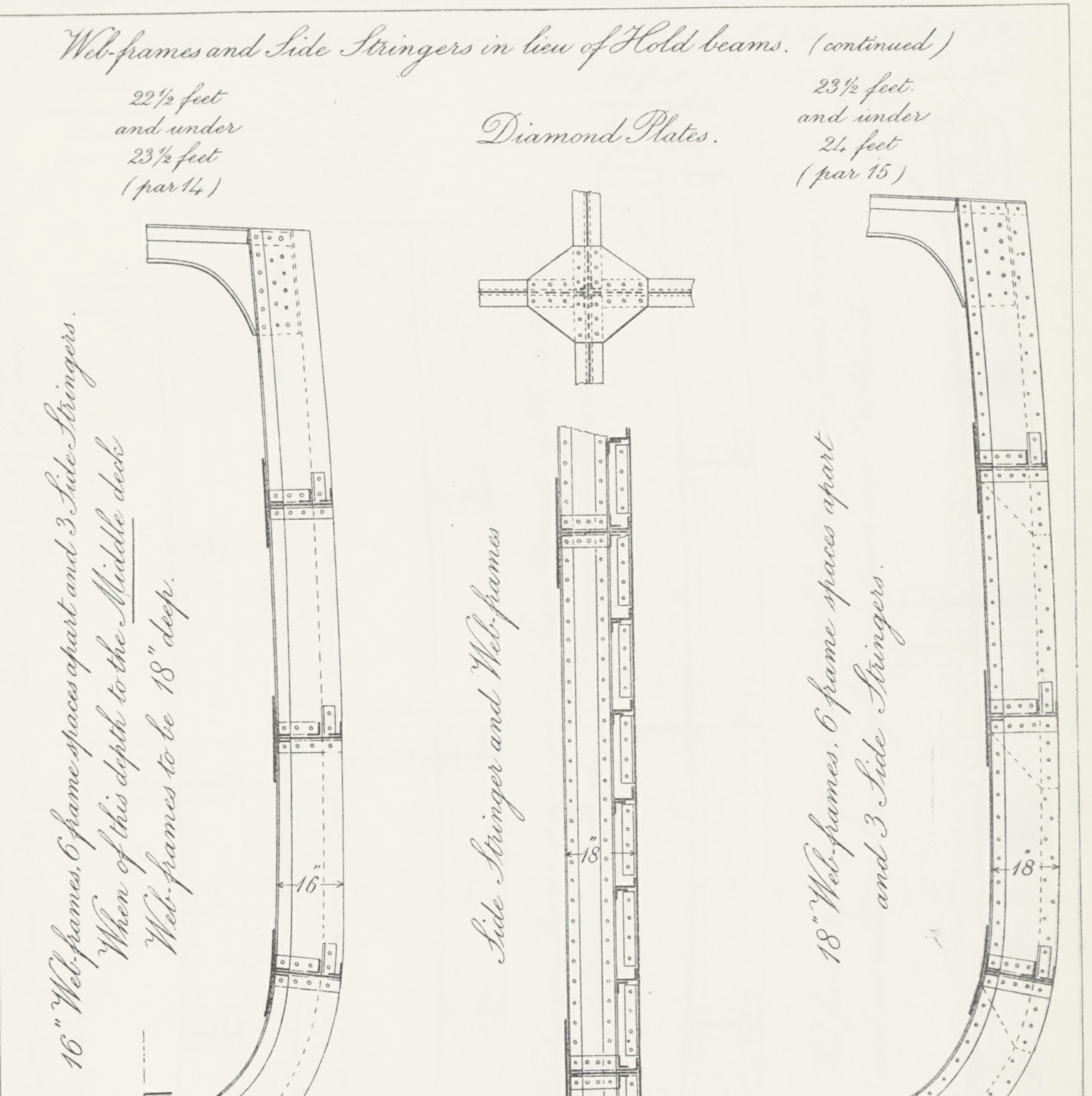
21½ feet and under 22½ feet (par 13)

15" Web-frames, 6 frame spaces apart
and 3 Side Stringers.
When of this depth to *Middle* deck, Web-frames to be 18" deep and 3 Side Stringers.

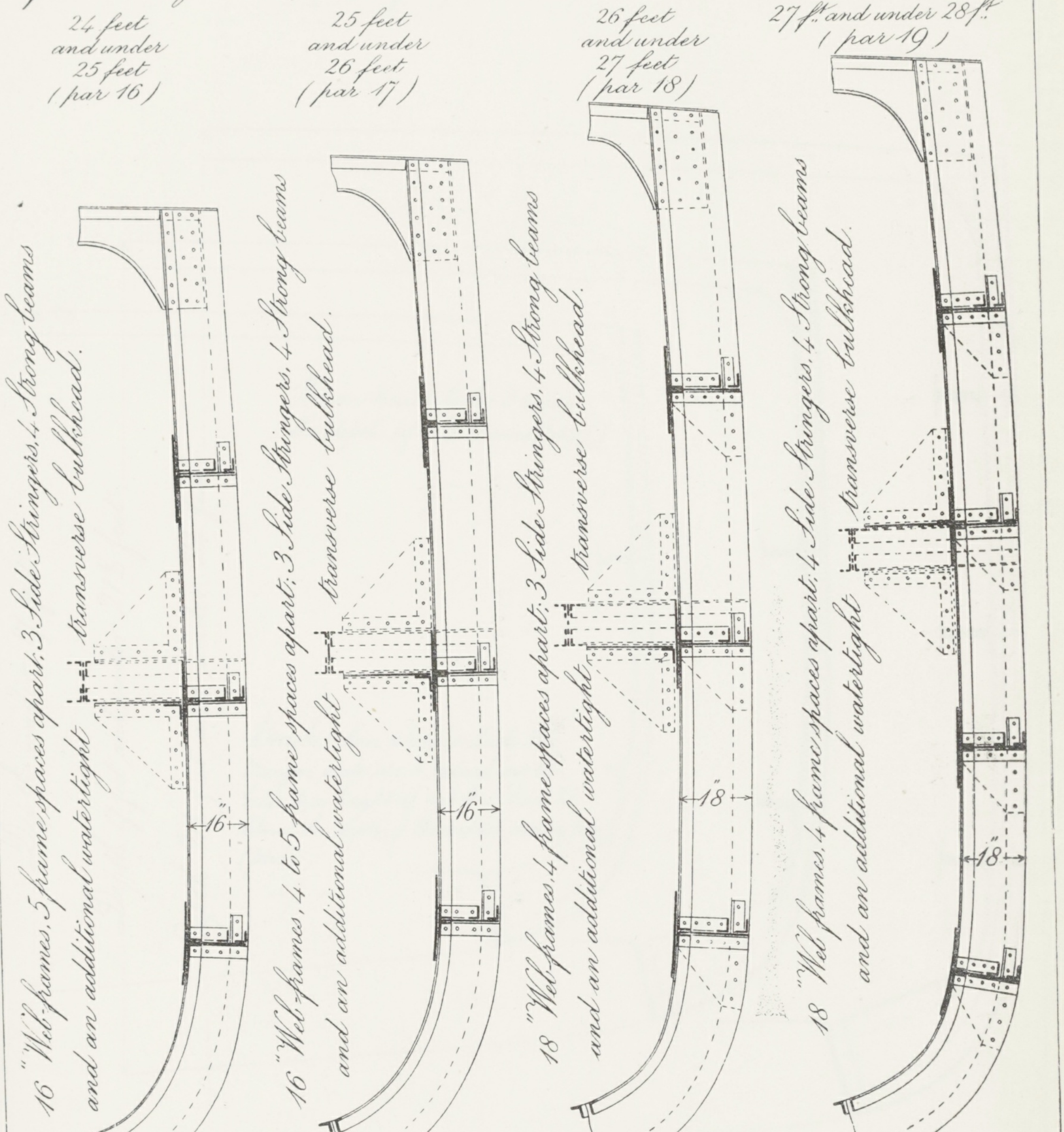


Or, In Vessels fitted with double bottoms, provided the brackets
outside the margin plate be extended up the bilges to a height of
three times the depth of the ordinary rule floor at the middle line.
Web-frames may be 18" deep 6 frame spaces apart with 2 Side Stringers.

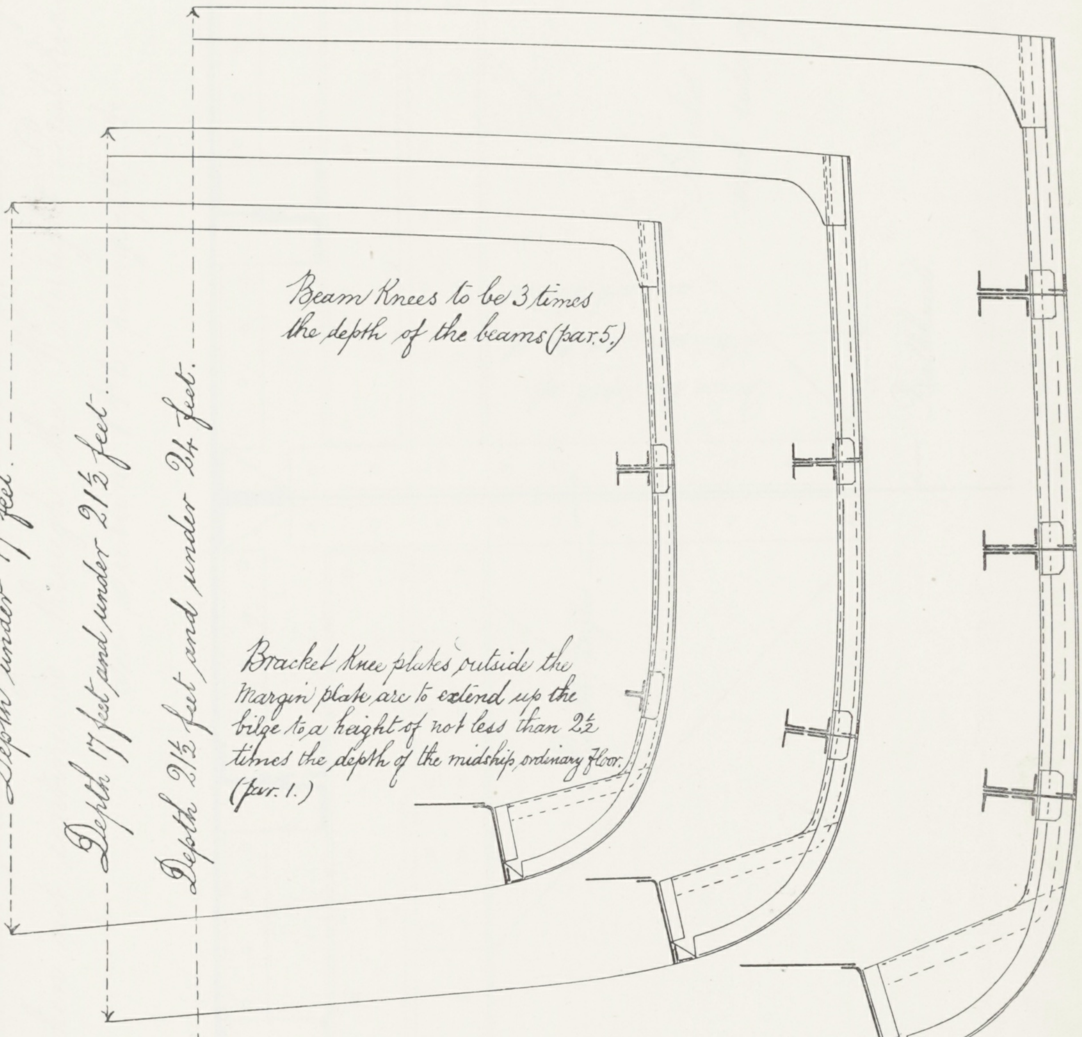



Web-frames and Side Stringers in lieu of Hold beams. (continued)
22½ feet and under 23½ feet (par 14)
Diamond Plates.
23½ feet and under 24 feet (par 15)
16" Web-frames, 6 frame spaces apart and 3 Side Stringers.
When of this depth to the Middle deck
Web-frames to be 18" deep.
16"
Side Stringer and Web-frames
18"
18" Web-frames, 6 frame spaces apart
and 3 Side Stringers.
18"

Web-frames in way of Raised Quarter Deck in lieu of lower deck beams and beams of extra strength wide spaced in lower hold. (see section 14a paragraphs 16 to 19)

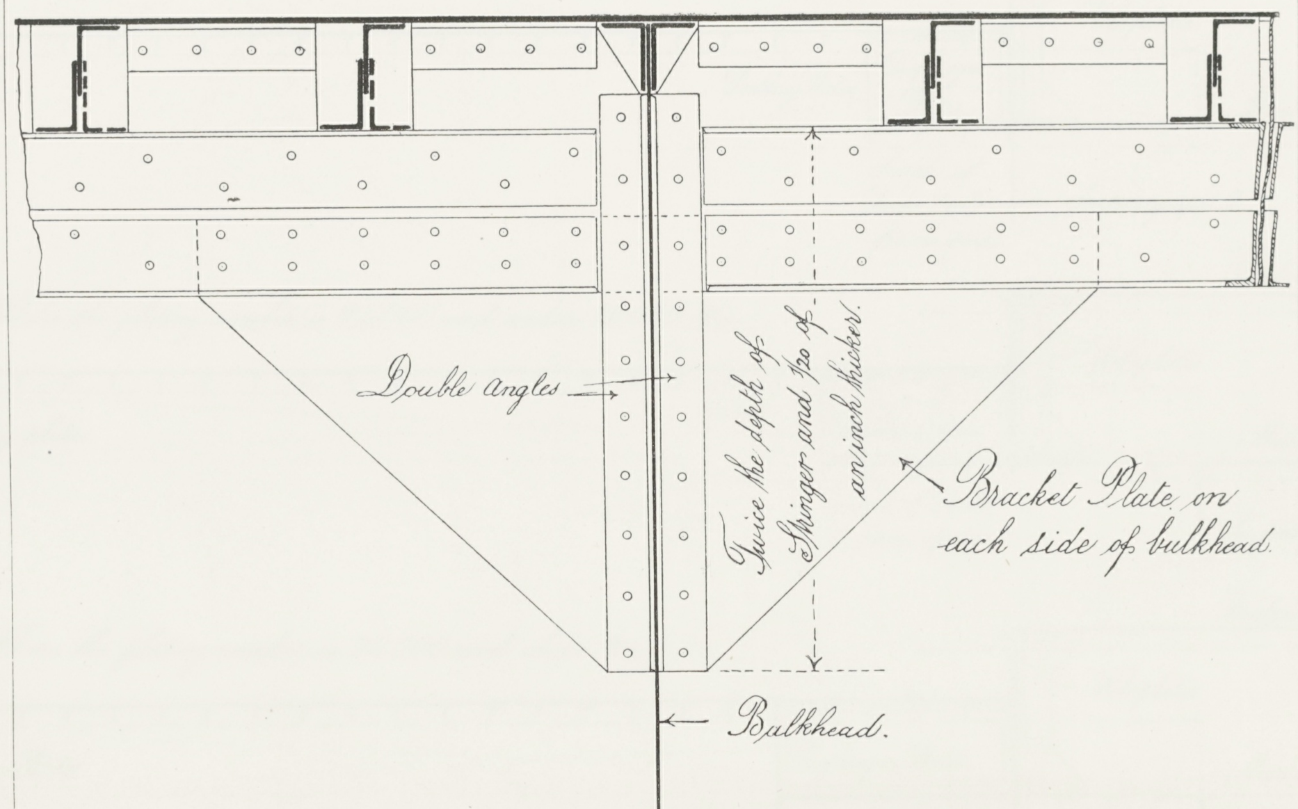


Sketches illustrating the arrangement of Side Stringers and Deep Framing in lieu of Hold Beams or Web-frames, as per Section 14b. paragraph 4.



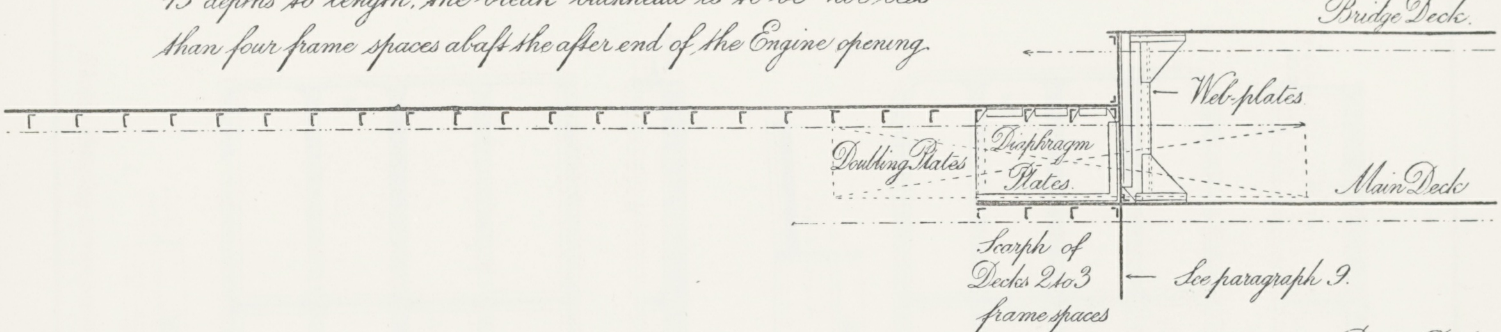
Sketch illustrating the connections of Side Stringers when not continuous through the Watertight Bulkheads.

See Section 14b., paragraph 4.

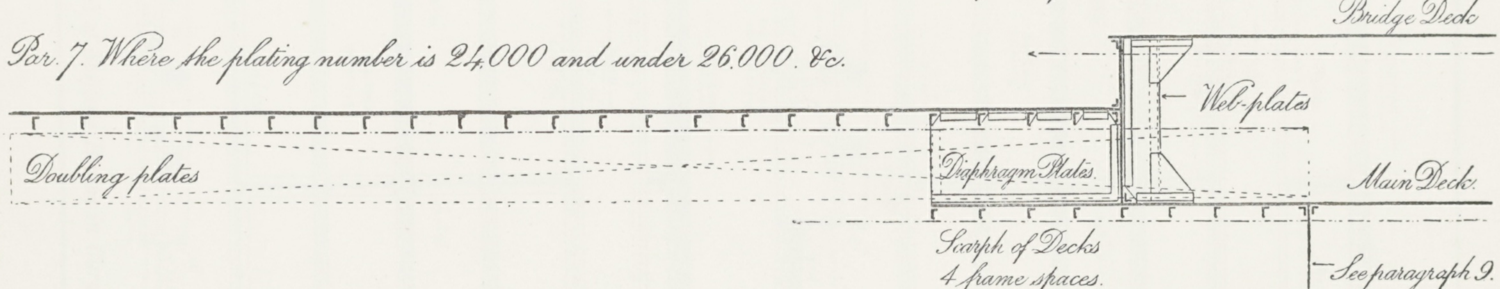


Section 45. Sketches shewing arrangements at Break of Raised Quarter Deck as per paragraphs 5.6.7.8 & 9.

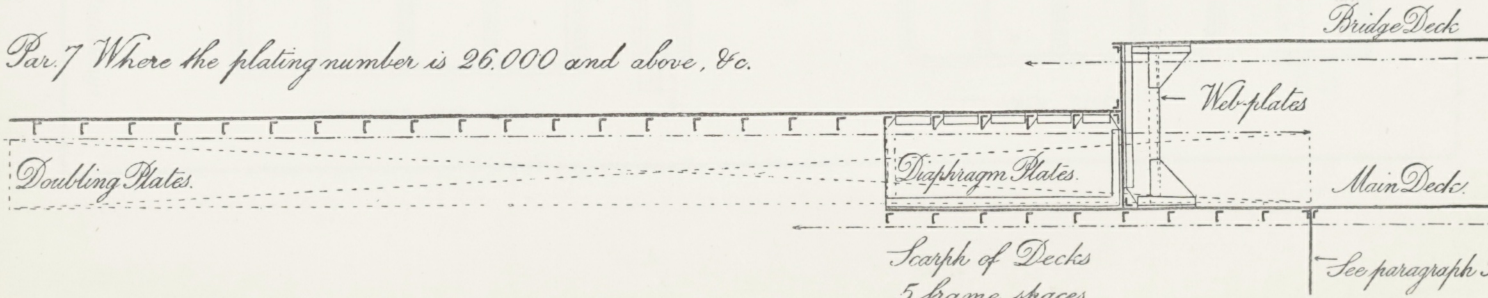
Paragraph 9. Where the plating number exceeds 20,000 or the Vessel is over 13 depths to length, the break bulkhead is to be not less than four frame spaces abaft the after end of the Engine opening.

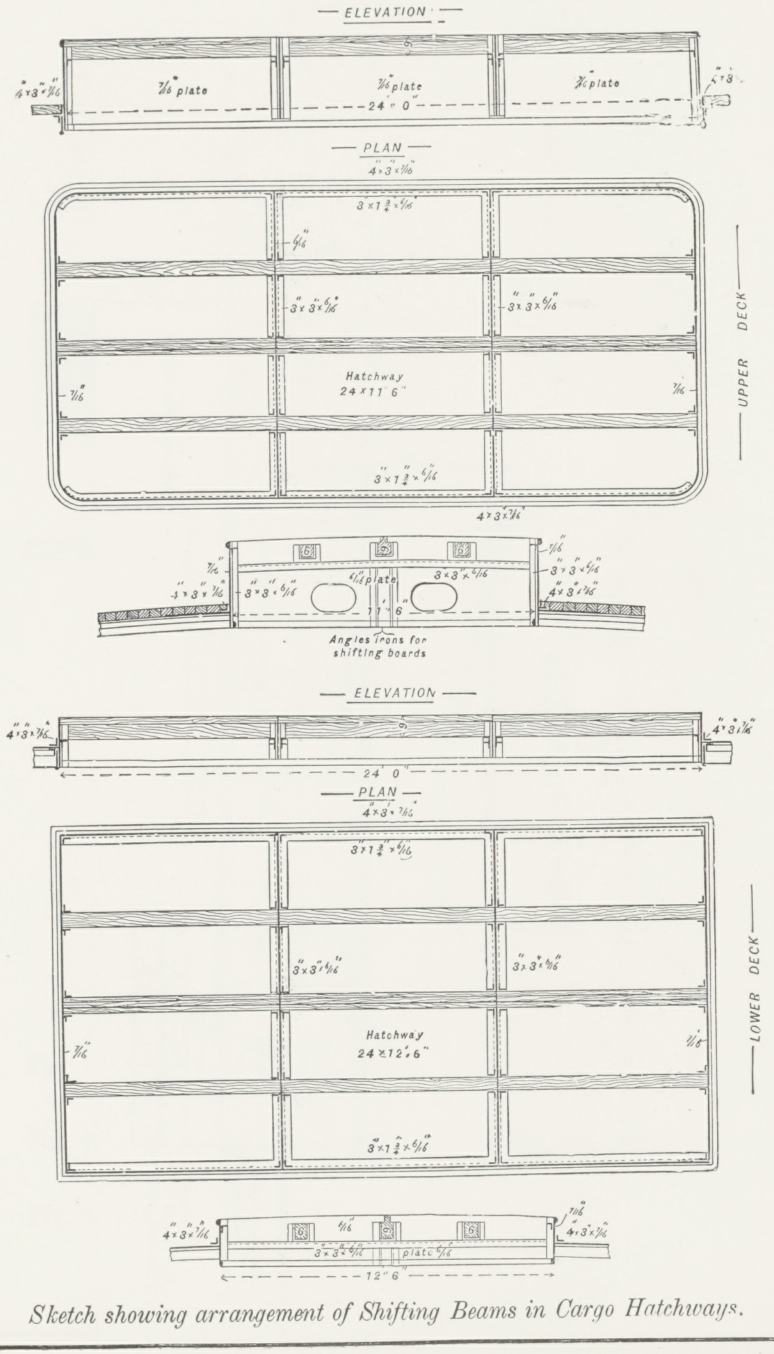


Par. 7. Where the plating number is 24,000 and under 26,000. &c.



Par. 7 Where the plating number is 26,000 and above, &c.





Sketch showing arrangement of Shifting Beams in Cargo Hatchways.

FIG. 1.

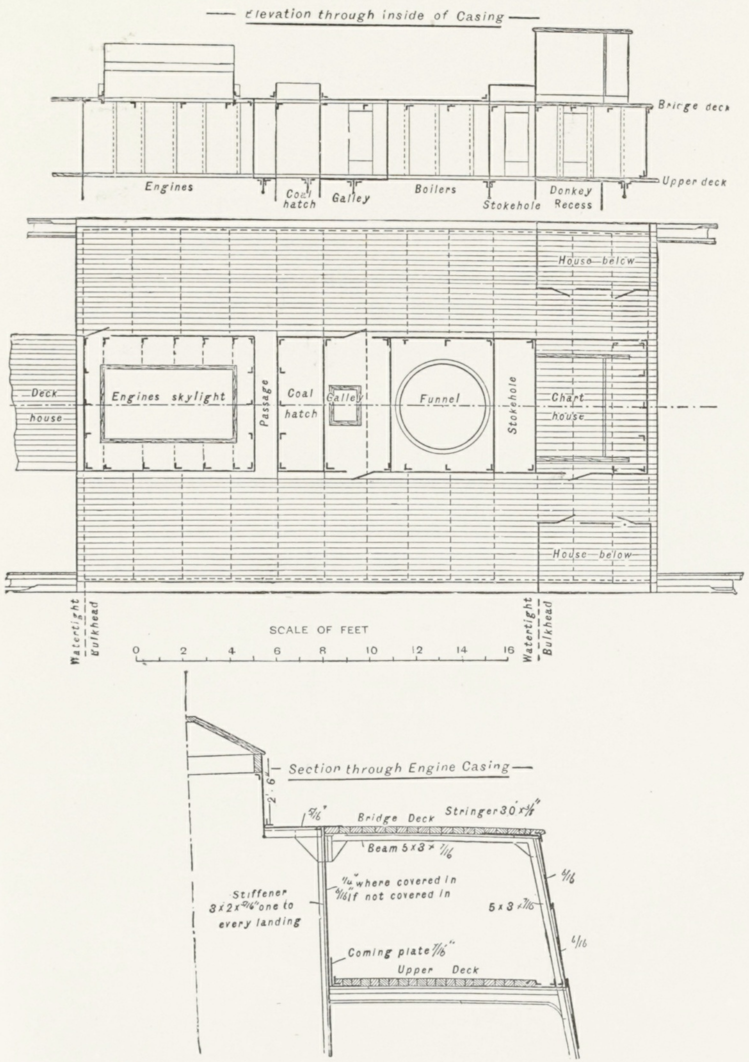


FIG. 2.

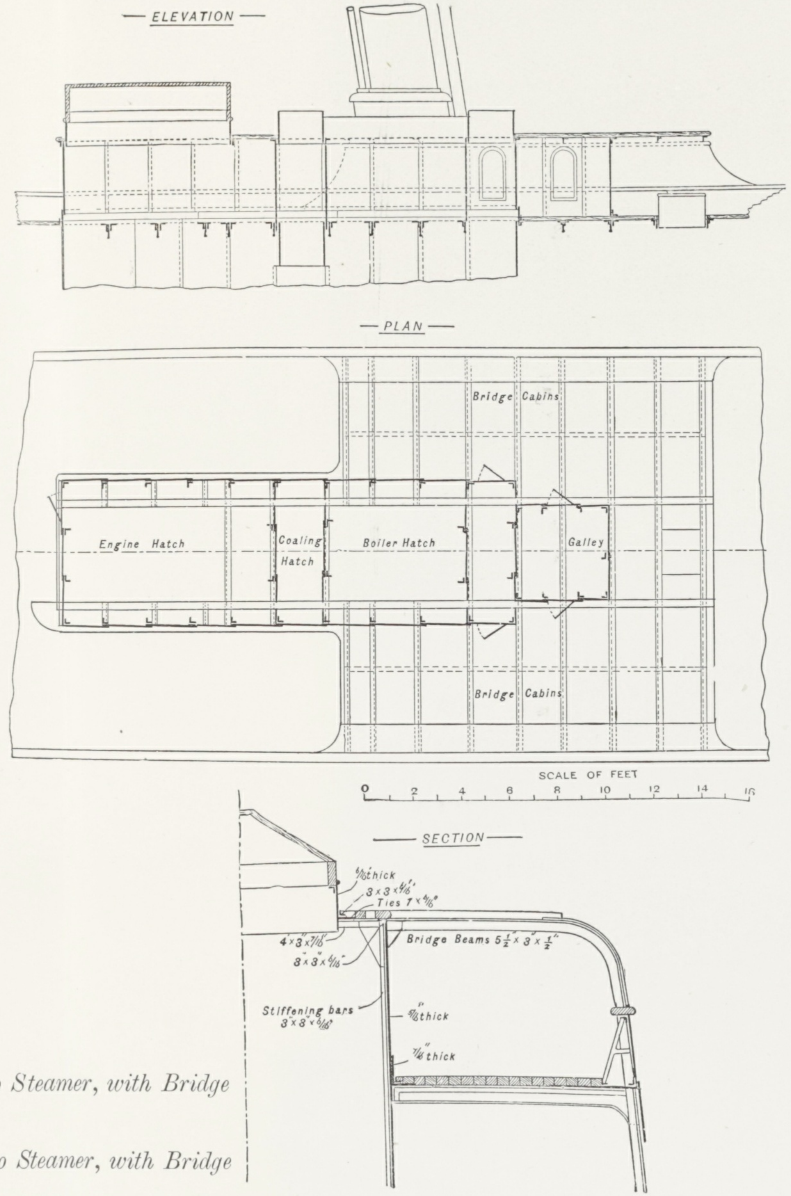


FIG. 3.

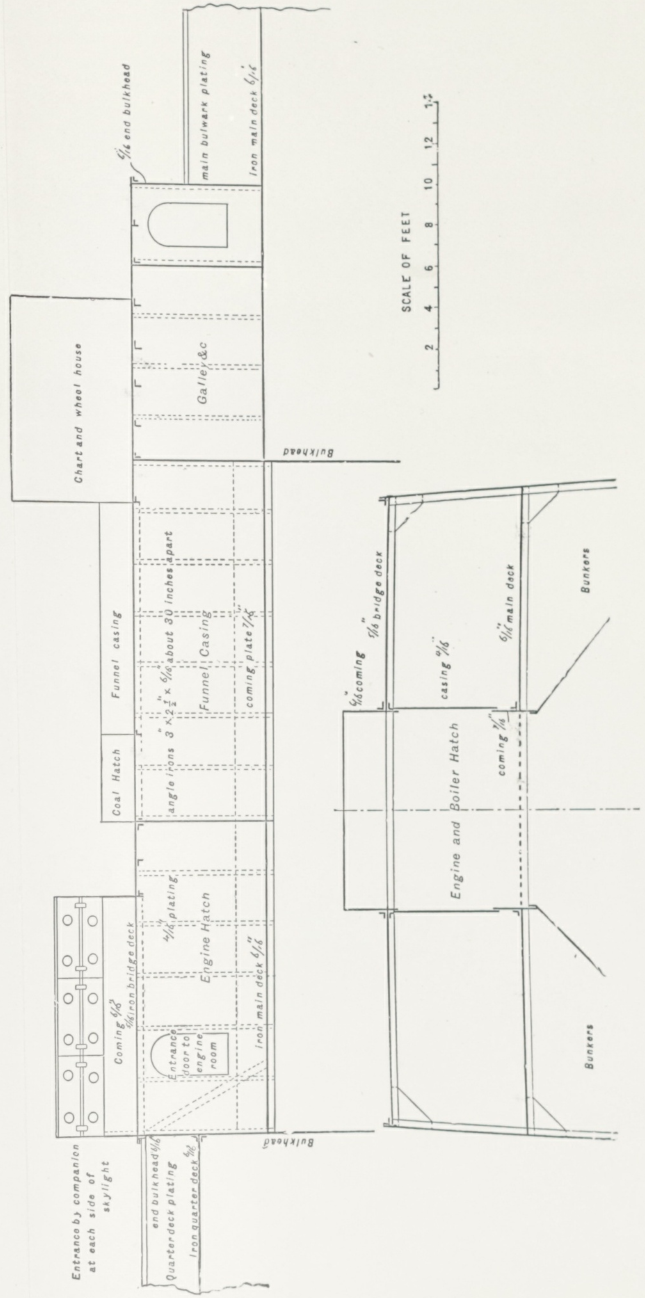
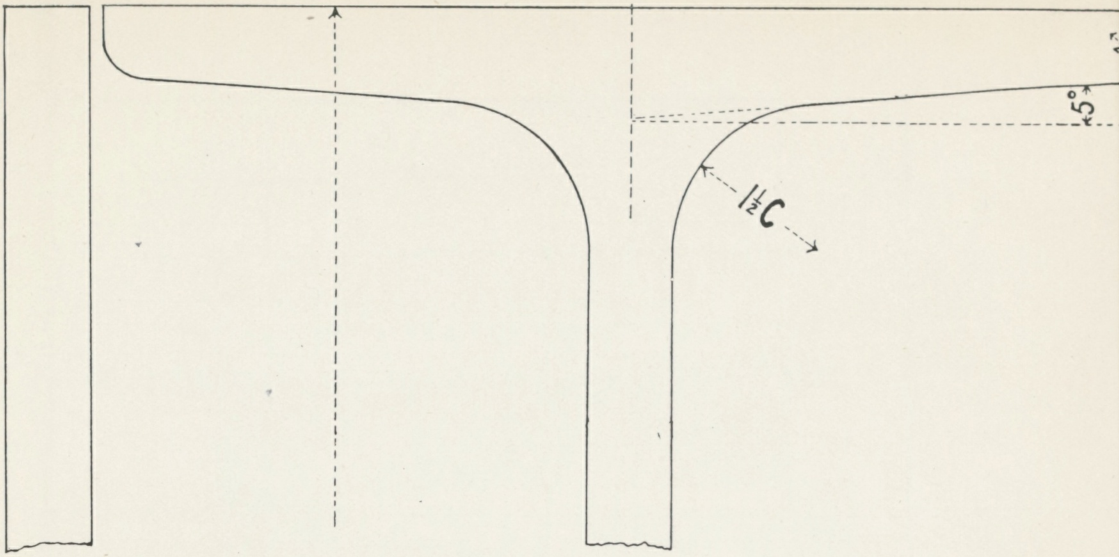


Fig. 1.—*Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck extending the whole length of the Openings.*

Fig. 2.—*Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck covering the Boiler Hatchway.*

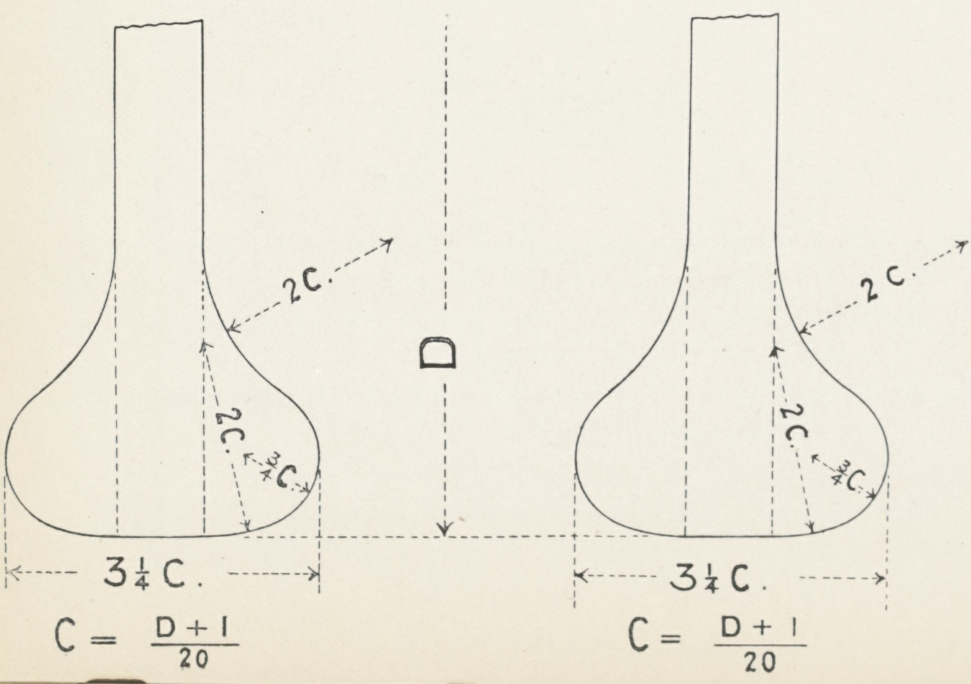
Fig. 3.—*Sketch of Engine and Boiler Casings in a Vessel with a Long Raised Quarter Deck and Enclosed Bridge House.*

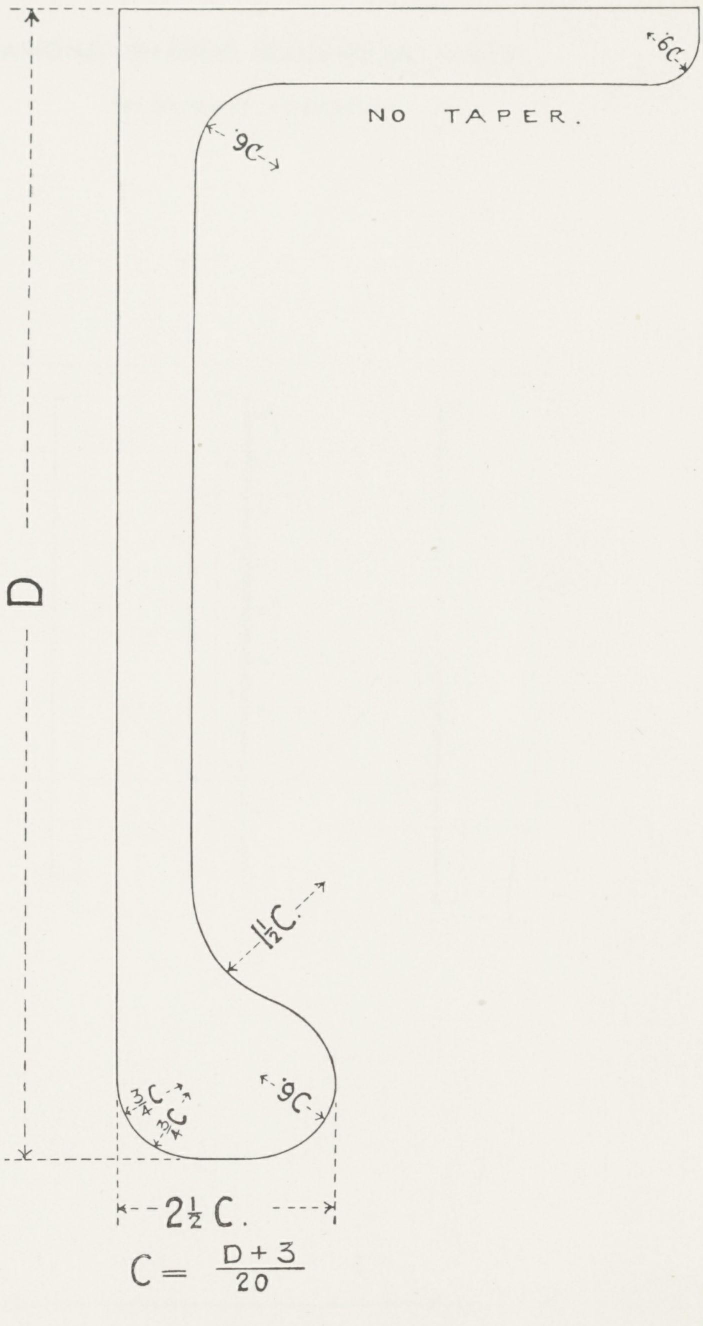


SKETCHES SHOWING WIDTH OF BULB OF BULB PLATES, T BULBS, AND BULB ANGLES.

The depth in inches D of the section to be the base from which to deduce the other dimensions. The widths of the bulbs t be $2\frac{1}{2}$ C for bulb angles, and $3\frac{1}{4}$ C for bulb plates and bulb tees—where C is $\frac{D+3}{20}$ in the case of bulb angles, and $\frac{D+1}{20}$ f bulb plates and bulb tees. The form of the bulbs to be in accordance with the sketches.

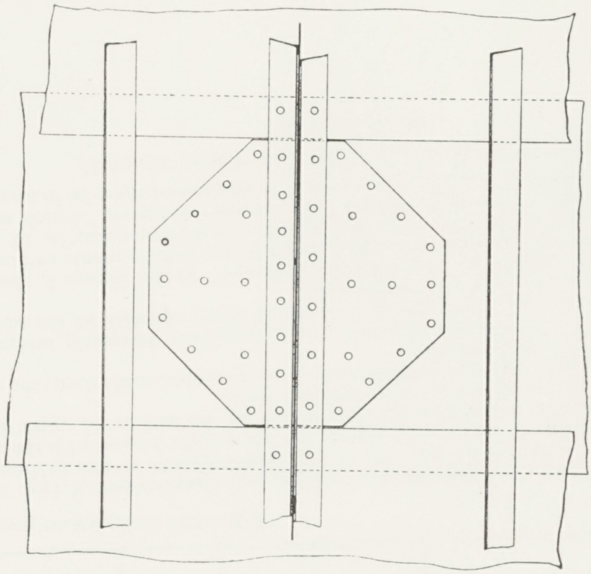
The standard thickness for regulating the width of bulb of beams and bars whose depth is not an exact number of inch should correspond to the depth in inches next below the actual depth, thus—for T beams and bulb plates $10\frac{1}{2}$ inches deep, th standard thickness to be used in determining the dimensions of the bulb should be $\frac{10+1}{20}$ or $\frac{11}{20}$.




·6C
NO TAPER.
·9C
D
$1\frac{1}{2}$C
$\frac{3}{4}$C
$\frac{3}{4}$C
·9C
$2\frac{1}{2}$ C.
$C = \frac{D+3}{20}$

DIAMOND SHAPED BULKHEAD LINER.

See Section 22, paragraph 6.



Extract from the Rules, Section 32.

Tonnage for Regulating the Scantlings and Equipment (as regards Anchors, Chains, &c.) of Wood and Composite Vessels.

In flush-decked vessels having either one, two or three decks (not being spar or awning-decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels,* is to regulate all the scantlings of the hull, and also the equipment of the vessel, as regards anchors, chains, warps, &c.

† In vessels having a *raised quarter deck,* or a poop, or top-gallant forecastle, or deck houses, or awning-deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull, but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the tonnage of the space required for propelling power,* is to regulate the equipment.

But in vessels where the tonnage of the erections above the tonnage deck is less than that allowed for crew space, *then the difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment.

No. 304.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CHAIN CABLES.

Testing to Breaking Strain.

"Chains tested under the Chain Cable and Anchor Act of 1864, at a Machine recognised by the Committee, will be accepted for any Vessel built, commenced, or contracted for *prior* to the 1st July, 1872; and all Vessels built, commenced, or contracted for *after* the 30th June, 1872, will be required to be supplied with Chains tested in conformity with the requirements of the New Act."

By order of the Committee,
BERNARD WAYMOUTH,
Secretary.

2, White Lion Court, Cornhill, London, E.C.
1st January, 1873.

(i) STEEL WIRE TOWLINES, HAWSERS AND WARPS.

(i) When steel wire towlines, hawsers, or warps are adopted, a short length of each of the wires composing the towline, &c., will be required, after being galvanised, to withstand a tensile stress equivalent to that set forth in Table 22, and the aggregate strength of the wires must not be less than ten per cent. in excess of that stress.

Each wire will be required to be capable of being twisted around itself not less than eight times, and of being untwisted and straightened without breaking.

Each manufacturer to be required to provide on his premises machines suitable for satisfactorily making the foregoing tests, and the works to be at all times open to the inspection of the Society's Surveyors, who are to be empowered to retest any hawser or towline for which a certificate has been issued by the manufacturer.

Printed Forms of Certificates, approved by the Committee, to be given by the Manufacturers of Steel Wire Hawsers, will be supplied to them upon application to the Secretary.

20th December, 1883.

N.B.—The Italic letters preceding the Equipment numbers correspond with letters printed in the eighth column in the List of Sailing Vessels in the Register Book to indicate the Equipment numbers of Vessels per this Table.

CHAINS AND ANCHORS FOR SAILING VESSELS.

(For Steam Vessels, see other side).

Minimum Weights of Anchors, ex. Stock; Sizes, Lengths and Weights of Chains, and the Proof Strain to which they are to be tested per Chain Cables and Anchors Acts. Also Sizes and Lengths of Towlines, Hawsers and Warps. The Anchors, and the links of the Chains to be of unexceptionable form and proportions.

ANCHORS.

Numbers for Iron and Steel Vessels. See Footnote (a).	Gross Tonnage less Crew Space. See Note†	Number: Bowers.	Number: Stream.	Number: Kedge.	Bower Anchors (b) (d), Ex. Stock: Weight	Bower Anchors: Test.*	Bower Anchors: Collective Weight.	Stream and Kedge Anchors, Ex. Stock: Stream.	Test.*	Kedge.	Test.*	Stud-Chain Cables (e) (f) (h): Length.	Minimum Size.	Proved to Statutory Test.	Breaking Test.	Minimum Weight.		
	Tons.				Cwts.	Tons.	Cwts.	Cwts.	Tons.	Cwts.	Tons.	Fathoms.	Inches.	Tons.	Tons.	Cwts.	qrs.	lbs.
a 1900 and under	50 and under	2	1	1	$3\frac{1}{2}$	$5\frac{18}{20}$	7	$\frac{3}{4}$	—	$\frac{1}{2}$	—	120	$\frac{11}{16}$	$8\frac{5}{10}$	$12\frac{3}{4}$	29	0	14
b 2500 and under	75 and under	2	1	1	$4\frac{1}{4}$	$6\frac{12}{20}$	$8\frac{1}{2}$	$1\frac{1}{4}$	—	$\frac{1}{2}$	—	120	$\frac{12}{16}$	$10\frac{1}{8}$	$15\frac{1}{8}$	34	2	7
c 3100 and under	100 and under	2	1	1	5	$7\frac{7}{20}$	10	$1\frac{1}{2}$	$3\frac{18}{20}$	$\frac{3}{4}$	—	135	$\frac{13}{16}$	$11\frac{7}{8}$	$17\frac{8}{10}$	45	3	3
d 3650 and under	125 and under	2	1	1	$5\frac{3}{4}$	8	$11\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{18}{20}$	$\frac{3}{4}$	—	165	$\frac{14}{16}$	$13\frac{3}{4}$	$20\frac{5}{8}$	64	1	11
e 4200 and under	150 and under	2	1	1	$6\frac{1}{2}$	$8\frac{15}{20}$	13	2	$4\frac{10}{20}$	1	—	165	$\frac{15}{16}$	$15\frac{8}{10}$	$23\frac{7}{10}$	74	1	26
f 4700 and under	175 and under	2	1	1	$7\frac{1}{4}$	$9\frac{9}{20}$	$14\frac{1}{2}$	$2\frac{1}{4}$	$4\frac{15}{20}$	1	—	165	1	18	27	84	0	17
g 5150 and under	200 and under	3	1	1	$8\frac{1}{4}$	$10\frac{7}{20}$	$23\frac{1}{2}$	$2\frac{1}{2}$	5	$1\frac{1}{4}$	—	165	$1\frac{1}{16}$	$20\frac{3}{10}$	$30\frac{4}{10}$	95	1	9
h 6000 and under	250 and under	3	1	1	10	12	$28\frac{1}{2}$	$3\frac{3}{4}$	$6\frac{3}{20}$	$1\frac{3}{4}$	$4\frac{4}{20}$	195	$1\frac{2}{16}$	$22\frac{3}{4}$	$34\frac{1}{8}$	126	1	0
i 6800 and under	300 and under	3	1	1	12	$13\frac{17}{20}$	$34\frac{1}{4}$	4	$6\frac{7}{20}$	2	$4\frac{10}{20}$	195	$1\frac{3}{16}$	$25\frac{3}{8}$	38	141	0	16
j 7550 and under	350 and under	3	1	1	$13\frac{1}{2}$	$15\frac{3}{20}$	$38\frac{1}{2}$	$4\frac{3}{4}$	$7\frac{2}{20}$	$2\frac{1}{2}$	5	210	$1\frac{4}{16}$	$28\frac{1}{8}$	$42\frac{1}{8}$	168	0	0
k 8250 and under	400 and under	3	1	1	$15\frac{1}{4}$	$16\frac{14}{20}$	$43\frac{1}{2}$	$5\frac{1}{4}$	$7\frac{11}{20}$	$2\frac{1}{2}$	5	210	$1\frac{5}{16}$	31	$46\frac{1}{2}$	185	2	12
l 8900 and under	450 and under	3	1	1	$16\frac{3}{4}$	18	$47\frac{3}{4}$	$5\frac{1}{2}$	$7\frac{16}{20}$	$2\frac{3}{4}$	$5\frac{5}{20}$	240	$1\frac{6}{16}$	34	51	232	0	21
m 9600 and under	500 and under	3	1	1	18	19	$51\frac{1}{4}$	$6\frac{1}{2}$	$8\frac{15}{20}$	$3\frac{1}{4}$	$5\frac{14}{20}$	240	$1\frac{7}{16}$	$37\frac{1}{8}$	$55\frac{5}{8}$	254	0	19
n 10800 and under	600 and under	3	1	1	21	$21\frac{12}{20}$	60	$7\frac{1}{4}$	$9\frac{9}{20}$	$3\frac{1}{2}$	$5\frac{18}{20}$	240	$1\frac{8}{16}$	$40\frac{5}{10}$	$58\frac{7}{10}$	276	2	14
o 12000 and under	700 and under	3	1	1	$23\frac{1}{2}$	$23\frac{10}{20}$	67	8	$10\frac{2}{20}$	4	$6\frac{7}{20}$	270	$1\frac{9}{16}$	$43\frac{9}{10}$	$61\frac{4}{10}$	336	0	0
p 13200 and under	800 and under	3	1	1	$25\frac{1}{2}$	$25\frac{3}{20}$	$72\frac{3}{4}$	$8\frac{1}{2}$	$10\frac{12}{20}$	$4\frac{1}{4}$	$6\frac{12}{20}$	270	$1\frac{10}{16}$	$47\frac{5}{10}$	$66\frac{5}{10}$	359	1	9
q 14400 and under	900 and under	3	1	1	$27\frac{3}{4}$	$26\frac{18}{20}$	79	$8\frac{3}{4}$	$10\frac{17}{20}$	$4\frac{1}{2}$	$6\frac{17}{20}$	270	$1\frac{11}{16}$	$51\frac{1}{4}$	$71\frac{3}{4}$	387	3	4
r 15500 and under	1000 and under	3	1	1	30	$28\frac{12}{20}$	$85\frac{1}{2}$	$9\frac{1}{2}$	$11\frac{11}{20}$	$4\frac{3}{4}$	$7\frac{2}{20}$	270	$1\frac{12}{16}$	$55\frac{1}{8}$	$77\frac{1}{8}$	416	3	0
s 17600 and under	1200 and under	3	1	1	32	$30\frac{2}{20}$	$91\frac{1}{4}$	$10\frac{1}{2}$	$12\frac{8}{20}$	$5\frac{1}{4}$	$7\frac{11}{20}$	270	$1\frac{13}{16}$	$59\frac{1}{8}$	$82\frac{3}{4}$	447	2	3
t 19600 and under	1400 and under	3	1	1	34	$31\frac{12}{20}$	97	$10\frac{3}{4}$	$12\frac{13}{20}$	$5\frac{1}{2}$	$7\frac{16}{20}$	270	$1\frac{14}{16}$	$63\frac{1}{4}$	$88\frac{5}{10}$	478	1	18
u 21600 and under	1600 and under	3	1	1	$36\frac{1}{2}$	$33\frac{8}{20}$	104	$11\frac{1}{4}$	$13\frac{2}{20}$	$5\frac{1}{2}$	$7\frac{16}{20}$	270	$1\frac{15}{16}$	$67\frac{5}{10}$	$94\frac{5}{10}$	511	1	14
v 23400 and under	1800 and under	3	1	1	38	$34\frac{10}{20}$	$108\frac{1}{4}$	$11\frac{1}{2}$	$13\frac{7}{20}$	$5\frac{3}{4}$	8	270	2	72	$100\frac{8}{10}$	538	3	0
w 25100 and under	2000 and under	3	1	1	40	$35\frac{15}{20}$	114	12	$13\frac{17}{20}$	6	$8\frac{5}{20}$	270	$2\frac{1}{16}$	$76\frac{5}{10}$	$107\frac{1}{10}$	573	2	14
x 29400 and under	2500 and under	3	1	1	42	$37\frac{2}{20}$	$119\frac{3}{4}$	$13\frac{1}{2}$	$15\frac{3}{20}$	$6\frac{3}{4}$	9	300	$2\frac{3}{16}$	$86\frac{1}{8}$	$120\frac{5}{10}$	717	2	0
y 33400 and under	3000 and under	3	1	1	45	$39\frac{5}{20}$	$128\frac{1}{4}$	$15\frac{1}{4}$	$16\frac{14}{20}$	$7\frac{1}{2}$	$9\frac{13}{20}$	300	$2\frac{5}{16}$	$96\frac{1}{4}$	$134\frac{3}{4}$	800	3	14
z 37200 and under 40800	3500 and under 4000	4	1	1	48	$41\frac{2}{20}$	185	17	$18\frac{5}{20}$	$8\frac{1}{2}$	$10\frac{12}{20}$	300	$2\frac{6}{16}$	$101\frac{1}{2}$	$142\frac{1}{10}$	844	1	0

CHAIN CABLES, HAWSERS, &c.

Stream, Chain or Steel Wire (e) (g): Length.	Chain: Size.	Chain, Minimum Weight, Stud Link: Cwts.	qrs.	lbs.	Short Link: Cwts.	qrs.	lbs.	Steel Wire (i): Size.	Breaking Test.	Towline: Hemp or Steel Wire (i): Length.	Hemp: Size.	Steel Wire: Size.	Breaking Test.	Hawsers and Warps. 90 fathoms of each.		Gross Tonnage less Crew Space. See Note†	Numbers for Iron and Steel Vessels. See Footnote (a).
Fathoms.	Inches.	Cwts.	qrs.	lbs.	Cwts.	qrs.	lbs.	Inches.	Tons.	Fathoms.	Inches.	Inches.	Tons.	Inches.	Inches.	Tons.	
45	$\frac{7}{16}$	5	1	0	5	3	0	—	—	75	5	—	—	3	—	50 and under	*a* 1900 and under
45	$\frac{8}{16}$	6	2	0	7	1	0	—	—	75	$5\frac{1}{2}$	—	—	3	—	75 and under	*b* 2500 and under
45	$\frac{8}{16}$	6	2	0	7	1	0	—	—	75	$5\frac{1}{2}$	—	—	3	—	100 and under	*c* 3100 and under
45	$\frac{8}{16}$	6	2	0	7	1	0	—	—	75	6	—	—	$3\frac{1}{2}$	—	125 and under	*d* 3650 and under
45	$\frac{9}{16}$	8	0	0	8	3	0	2	7	75	$6\frac{1}{2}$	—	—	4	—	150 and under	*e* 4200 and under
45	$\frac{9}{16}$	8	0	0	8	3	0	2	7	75	$6\frac{1}{2}$	—	—	4	—	175 and under	*f* 4700 and under
45	$\frac{10}{16}$	9	3	0	10	2	0	$2\frac{1}{4}$	$9\frac{1}{2}$	75	7	—	—	4	—	200 and under	*g* 5150 and under
45	$\frac{10}{16}$	9	3	0	10	2	0	$2\frac{1}{4}$	$9\frac{1}{2}$	75	$7\frac{1}{2}$	—	—	5	—	250 and under	*h* 6000 and under
60	$\frac{11}{16}$	14	2	7	15	3	7	$2\frac{3}{4}$	$15\frac{1}{2}$	75	8	—	—	$5\frac{1}{2}$	—	300 and under	*i* 6800 and under
60	$\frac{11}{16}$	14	2	7	15	3	7	$2\frac{3}{4}$	$15\frac{1}{2}$	75	8	—	—	$5\frac{1}{2}$	—	350 and under	*j* 7550 and under
60	$\frac{12}{16}$	17	1	3	18	3	3	$2\frac{3}{4}$	$15\frac{1}{2}$	75	$8\frac{1}{2}$	—	—	6	—	400 and under	*k* 8250 and under
60	$\frac{12}{16}$	17	1	3	18	3	3	$2\frac{3}{4}$	$15\frac{1}{2}$	75	9	—	—	$6\frac{1}{2}$	—	450 and under	*l* 8900 and under
60	$\frac{13}{16}$	20	1	11	22	0	11	3	18	75	$9\frac{1}{2}$	—	—	7	—	500 and under	*m* 9600 and under
60	$\frac{13}{16}$	20	1	11	22	0	11	3	18	90	10	$3\frac{1}{4}$	22	7	4	600 and under	*n* 10800 and under
60	$\frac{14}{16}$	23	1	17	25	1	17	$3\frac{1}{4}$	22	90	10	$3\frac{1}{4}$	22	8	5	700 and under	*o* 12000 and under
75	$\frac{14}{16}$	29	1	0	31	2	0	$3\frac{1}{4}$	22	90	10	$3\frac{1}{4}$	22	8	5	800 and under	*p* 13200 and under
75	$\frac{15}{16}$	33	3	11	36	1	11	$3\frac{1}{2}$	26	90	$10\frac{1}{2}$	$3\frac{1}{4}$	22	9	$5\frac{1}{2}$	900 and under	*q* 14400 and under
75	$\frac{15}{16}$	33	3	11	36	1	11	$3\frac{1}{2}$	26	90	$10\frac{1}{2}$	$3\frac{1}{4}$	22	9	$5\frac{1}{2}$	1000 and under	*r* 15500 and under
75	1	38	1	0	41	1	0	$3\frac{3}{4}$	29	90	11	$3\frac{1}{2}$	26	$9\frac{1}{2}$	6	1200 and under	*s* 17600 and under
75	1	38	1	0	41	1	0	$3\frac{3}{4}$	29	90	11	$3\frac{1}{2}$	26	10	6	1400 and under	*t* 19600 and under
75	$1\frac{1}{16}$	43	1	9	46	1	9	4	33	90	11	$3\frac{1}{2}$	26	$10\frac{1}{2}$	$6\frac{1}{2}$	1600 and under	*u* 21600 and under
75	$1\frac{1}{16}$	43	1	9	46	1	9	4	33	90	12	4	33	11	7	1800 and under	*v* 23400 and under
100	$1\frac{2}{16}$	64	2	27	68	0	27	$4\frac{1}{4}$	35	90	12	4	33	11	7	2000 and under	*w* 25100 and under
120	$1\frac{2}{16}$	77	2	21	83	1	21	$4\frac{1}{4}$	35	90	13	$4\frac{1}{2}$	39	12	8	2500 and under	*x* 29400 and under
120	$1\frac{3}{16}$	86	3	12	93	0	12	$4\frac{1}{2}$	39	90	13	$4\frac{1}{2}$	39	12	8	3000 and under	*y* 33400 and under
120	$1\frac{4}{16}$	96	0	0	103	0	0	$4\frac{3}{4}$	43	120	14	$4\frac{3}{4}$	43	13	9	3500 and under 4000	*z* 37200 and under 40800

(a) By Section 39 of the Rules for the Building and Classification of *Iron and Steel Vessels,* it is provided that "The equipment is to be regulated by the *Number* produced by the sum of the measurements of the half-moulded breadth of the vessel at the middle of the length, the depth from the upper part of keel to the top of the upper-deck beams, with the normal round-up, and the girth of the half-midship frame section of the vessel, measured from the centre line at top of keel to the upper deck stringer plate, multiplied by the length of the vessel, for a one, two, and three-decked vessel, and for a spar-decked vessel."

For a vessel with a poop, top-gallant forecastle, or a raised quarter-deck, the equipment number to be increased *one-fifteenth* beyond that which it would be if she were flush-decked.

Lloyd's Register of Shipping, 2, White Lion Court, Cornhill.
8th April, 1897.

(b) In order to meet the requirements of different trades, the weights of Anchors as given in the above Table may be modified as under:—
Where two Bower Anchors only are required, one of them may be $7\frac{1}{2}$ per cent. lighter than the weight set forth above, provided the collective weight of the two Anchors is equal to that given in the Table.
Where three Bower Anchors are required, one of them may be 15 per cent., and another $7\frac{1}{2}$ per cent. lighter than the weight set forth above, provided the collective weight of the three Anchors is equal to that given in the Table, but in no case may the best Bower Anchor be lighter than prescribed in the Table, nor the third Bower be lighter than is allowed by this footnote.
All Anchor Stocks must be of acknowledged and approved description, and be one-fourth the weight of the anchor given in the Table.

(d) All Anchors, including Stream and Kedge Anchors, exceeding 168 lbs. in weight, ex. Stock, to be tested according to the requirements of the Act of Parliament, and the Certificates of Test produced.

* The tests of Anchors in this Table are approximate tests; or as near the Statutory tests as can be expressed in tons and aliquot parts.

(e) The Chain Cables and Stream Chains to be tested in all cases according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(f) There should be included in the above weights, 2 End Shackles to each Cable; that is 4 for each outfit which contains two Cables.

(g) There should be included in the above weights, 2 End Shackles to each Stream Chain.

(h) Unstudded close-link Chains will be admitted as Cables, if proved to *two-thirds* the Test required for Stud-link Chains, for the *tensile* strain, and 100 per cent. above the *tensile* strain for the *breaking* strain.

(i) When steel wire Towlines or Hawsers are adopted, see note **i** at side of Table.

Where a departure from the requirements of the Table for Hawsers and Warps is proposed by an Owner, the same should be in all cases submitted in the first place for the consideration of the Committee.

CHAINS AND ANCHORS FOOR STEAM VESSELS.

(For Sailing Vessels see other side.)

Minimum Weights of Anchors, ex. Stock and Stockless; Sizes, Lengths and Weights of Chains, and the Proof Strain to which they are to be tested per Chain in Cables and Anchors Act. Also Sizes and Lengths of Towlines, Hawsers and Warps. The Anchors, and the links of the Chains to be of unexceptionable form and proportions.

ANCHORS.

Numbers for Iron and Steel Vessels. See Footnote (a)	Gross Tonnage less Crew Space. See Note†	Number.			Bower Anchors (b) (d)						Stream and Kedge Anchors (c)			
					Ex. Stock.			Stockless.			Ex Stock.			
		Bowers.	Stream.	Kedge.	Weight.	Test. *	Collective Weights.	Weight.	Test. *	Collective Weight.	Stream.	Test. *	Kedge.	Test. *
	Tons.				Cwts.	Tons.	Cwts.	Cwts.	Tons.	Cwts.	Cwts.	Tons.	Cwts.	Tons.
a 2750 and under 3750	75 and under 112	2	1	1	$3\frac{1}{2}$	$5\frac{18}{20}$	7	$4\frac{1}{2}$	$6\frac{17}{20}$	$8\frac{3}{4}$	$\frac{3}{4}$	—	$\frac{1}{2}$	—
b 3750 and under 4630	112 and under 150	2	1	1	$4\frac{1}{4}$	$6\frac{12}{20}$	$8\frac{1}{2}$	$5\frac{1}{4}$	$7\frac{11}{20}$	$10\frac{1}{2}$	$1\frac{1}{4}$	—	$\frac{1}{2}$	—
c 4630 and under 5420	150 and under 188	2	1	1	5	$7\frac{7}{20}$	10	$6\frac{1}{4}$	$8\frac{10}{20}$	$12\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{18}{20}$	$\frac{3}{4}$	—
d 5420 and under 6150	188 and under 225	2	1	1	$5\frac{3}{4}$	8	$11\frac{1}{2}$	$7\frac{1}{4}$	$9\frac{9}{20}$	$14\frac{1}{4}$	$1\frac{1}{2}$	$3\frac{18}{20}$	$\frac{3}{4}$	—
e 6150 and under 6840	225 and under 262	2	1	1	$6\frac{1}{2}$	$8\frac{15}{20}$	13	$8\frac{1}{4}$	$10\frac{7}{20}$	$16\frac{1}{4}$	2	$4\frac{10}{20}$	1	—
f 6840 and under 7490	262 and under 300	2	1	1	$7\frac{1}{4}$	$9\frac{9}{20}$	$14\frac{1}{2}$	9	$11\frac{2}{20}$	18	$2\frac{1}{4}$	$4\frac{15}{20}$	1	—
g 7490 and under 8670	300 and under 375	3	1	1	$8\frac{1}{4}$	$10\frac{7}{20}$	$23\frac{1}{2}$	$10\frac{1}{4}$	$12\frac{4}{20}$	$29\frac{1}{4}$	$2\frac{1}{2}$	5	$1\frac{1}{4}$	—
h 8670 and under 9770	375 and under 450	3	1	1	10	12	$28\frac{1}{2}$	$12\frac{1}{2}$	$14\frac{6}{20}$	$35\frac{1}{2}$	$3\frac{3}{4}$	$6\frac{3}{20}$	$1\frac{3}{4}$	$4\frac{4}{20}$
i 9770 and under 10790	450 and under 525	3	1	1	12	$13\frac{17}{20}$	$34\frac{1}{4}$	15	$16\frac{10}{20}$	$42\frac{3}{4}$	4	$6\frac{7}{20}$	2	$4\frac{10}{20}$
j 10790 and under 11740	525 and under 600	3	1	1	$13\frac{1}{2}$	$15\frac{3}{20}$	$38\frac{1}{2}$	$16\frac{3}{4}$	18	48	$4\frac{3}{4}$	$7\frac{2}{20}$	$2\frac{1}{2}$	5
k 11740 and under 12620	600 and under 675	3	1	1	$15\frac{1}{4}$	$16\frac{14}{20}$	$43\frac{1}{2}$	19	$19\frac{17}{20}$	$54\frac{1}{4}$	$5\frac{1}{4}$	$7\frac{11}{20}$	$2\frac{1}{2}$	5
l 12620 and under 13450	675 and under 750	3	1	1	$16\frac{3}{4}$	18	$47\frac{3}{4}$	$20\frac{3}{4}$	$21\frac{8}{20}$	$59\frac{1}{2}$	$5\frac{1}{2}$	$7\frac{16}{20}$	$2\frac{3}{4}$	$5\frac{5}{20}$
m 13450 and under 15120	750 and under 900	3	1	1	18	19	$51\frac{1}{4}$	$22\frac{1}{2}$	$22\frac{15}{20}$	64	$6\frac{1}{2}$	$8\frac{15}{20}$	$3\frac{1}{4}$	$5\frac{14}{20}$
n 15120 and under 16720	900 and under 1050	3	1	1	21	$21\frac{12}{20}$	60	$26\frac{1}{4}$	$25\frac{16}{20}$	75	$7\frac{1}{4}$	$9\frac{9}{20}$	$3\frac{1}{2}$	$5\frac{18}{20}$
o 16720 and under 18260	1050 and under 1200	3	1	1	$23\frac{1}{2}$	$23\frac{10}{20}$	67	$29\frac{1}{4}$	$28\frac{1}{20}$	$83\frac{3}{4}$	8	$10\frac{2}{20}$	4	$6\frac{7}{20}$
p 18260 and under 19780	1200 and under 1350	3	1	1	$25\frac{1}{2}$	$25\frac{3}{20}$	$72\frac{3}{4}$	$31\frac{3}{4}$	$29\frac{18}{20}$	$90\frac{3}{4}$	$8\frac{1}{2}$	$10\frac{12}{20}$	$4\frac{1}{4}$	$6\frac{12}{20}$
q 19780 and under 21280	1350 and under 1500	3	1	1	$27\frac{3}{4}$	$26\frac{18}{20}$	79	$34\frac{1}{2}$	32	$98\frac{3}{4}$	$8\frac{3}{4}$	$10\frac{17}{20}$	$4\frac{1}{2}$	$6\frac{17}{20}$
r 21280 and under 24220	1500 and under 1800	3	1	1	30	$28\frac{12}{20}$	$85\frac{1}{2}$	$37\frac{1}{2}$	$34\frac{2}{20}$	$106\frac{3}{4}$	$9\frac{1}{2}$	$11\frac{11}{20}$	$4\frac{3}{4}$	$7\frac{2}{20}$
s 24220 and under 27140	1800 and under 2100	3	1	1	32	$30\frac{2}{20}$	$91\frac{1}{4}$	40	$35\frac{15}{20}$	114	$10\frac{1}{2}$	$12\frac{8}{20}$	$5\frac{1}{4}$	$7\frac{11}{20}$
t 27140 and under 30020	2100 and under 2400	3	1	1	34	$31\frac{12}{20}$	97	$42\frac{1}{2}$	$37\frac{10}{20}$	$121\frac{1}{4}$	$10\frac{3}{4}$	$12\frac{13}{20}$	$5\frac{1}{2}$	$7\frac{16}{20}$
u 30020 and under 32820	2400 and under 2700	3	1	1	$36\frac{1}{2}$	$33\frac{8}{20}$	104	$45\frac{1}{2}$	$39\frac{11}{20}$	130	$11\frac{1}{4}$	$13\frac{2}{20}$	$5\frac{1}{2}$	$7\frac{16}{20}$
v 32820 and under 35450	2700 and under 3000	3	1	1	38	$34\frac{10}{20}$	$108\frac{1}{4}$	$47\frac{1}{2}$	$40\frac{16}{20}$	$135\frac{1}{4}$	$11\frac{1}{2}$	$13\frac{7}{20}$	$5\frac{3}{4}$	8
w 35450 and under 39600	3000 and under 3500	3	1	1	40	$35\frac{15}{20}$	114	50	$42\frac{7}{20}$	$142\frac{1}{2}$	12	$13\frac{17}{20}$	6	$8\frac{5}{20}$
x 39600 and under 43600	3500 and under 4000	4	1	1	$41\frac{1}{2}$	$36\frac{16}{20}$	$159\frac{3}{4}$	$51\frac{3}{4}$	$43\frac{9}{20}$	$199\frac{1}{2}$	$12\frac{3}{4}$	$14\frac{10}{20}$	$6\frac{1}{2}$	$8\frac{15}{20}$
y 43600 and under 47400	4000 and under 4500	4	1	1	43	$37\frac{17}{20}$	$165\frac{1}{2}$	$53\frac{3}{4}$	$44\frac{12}{20}$	$206\frac{3}{4}$	14	$15\frac{12}{20}$	7	$9\frac{5}{20}$
z 47400 and under 51000	4500 and under 5000	4	1	1	45	$39\frac{5}{20}$	$173\frac{1}{4}$	$56\frac{1}{4}$	$46\frac{3}{20}$	$216\frac{1}{2}$	$15\frac{1}{4}$	$16\frac{14}{20}$	$7\frac{1}{2}$	$9\frac{13}{20}$
a† 51000 and under 55000	5000 and under 5500	4	1	1	$46\frac{1}{2}$	$40\frac{3}{20}$	179	58	$47\frac{5}{20}$	$223\frac{3}{4}$	$16\frac{3}{4}$	18	$8\frac{1}{2}$	$10\frac{12}{20}$
b† 55000 and under 59000	5500 and under 6000	4	1	1	49	$41\frac{15}{20}$	188	$61\frac{1}{4}$	49	235	19	$19\frac{17}{20}$	$9\frac{1}{2}$	$11\frac{11}{20}$
c† 59000 and under 63000	6000 and under 6500	4	1	1	52	$43\frac{12}{20}$	198	65	51	$247\frac{1}{2}$	22	$22\frac{7}{20}$	$10\frac{1}{2}$	$12\frac{8}{20}$
d† 63000 and under 70000	6500 and under 7000	4	1	1	55	$45\frac{7}{20}$	210	$68\frac{3}{4}$	$53\frac{1}{20}$	$262\frac{1}{2}$	25	$24\frac{15}{20}$	12	$13\frac{17}{20}$

CHAIN CABLES, HAWSERS, &c.

Numbers for Iron and Steel Vessels	Stud-Chain Cables (e) (f) (h)							Stream, Chain in or Steel Wire (e) (g)											Towline: Hemp or Steel Wire (i)				Hawsers and Warps. 90 Fathoms of each.		Gross Tonnage less Crew Space. See Note†	Numbers for Iron and Steel Vessels, See Footnote (a)
	Length.	Minimum Size.	Proved to Statutory Test.	Breaking Test.	Minimum Weight.			Length.	Chain.								Steel Wire (i)		Length.	Hemp.	Steel Wire.					
									Size.	Minimum Weight. Stud Link.			Short Link.				Size.	Breaking Test.		Size.	Size.	Breaking Test.				
	Fathoms.	Inches.	Tons.	Tons.	Cwts.	qrs.	lbs.	Fathoms.	Inches.	Cwts.	qrs.	lbs.	Cwts.	qrs.	lbs.		Inches.	Tons.	Fathoms.	Inches.	Inches.	Tons.	Inches.	Inches.	Tons.	
a	120	$\frac{11}{16}$	$8\frac{5}{10}$	$12\frac{3}{4}$	29	0	14	45	$\frac{8}{16}$	6	2	0	7	1	0		—	—	75	$5\frac{1}{2}$	—	—	3	—	75 and under 112	*a* 2750 and under 3750
b	120	$\frac{12}{16}$	$10\frac{1}{8}$	$15\frac{1}{8}$	34	2	7	45	$\frac{9}{16}$	8	0	0	8	3	0		2	7	75	6	—	—	4	—	112 and under 150	*b* 3750 and under 4630
c	135	$\frac{13}{16}$	$11\frac{7}{8}$	$17\frac{8}{10}$	45	3	3	45	$\frac{9}{16}$	8	0	0	8	3	0		2	7	75	6	—	—	4	—	150 and under 188	*c* 4630 and under 5420
d	165	$\frac{14}{16}$	$13\frac{3}{4}$	$20\frac{5}{8}$	64	1	11	45	$\frac{10}{16}$	9	3	0	10	2	0		$2\frac{1}{4}$	$9\frac{1}{2}$	75	$6\frac{1}{2}$	—	—	4	—	188 and under 225	*d* 5420 and under 6150
e	165	$\frac{15}{16}$	$15\frac{8}{10}$	$23\frac{7}{10}$	74	1	26	45	$\frac{10}{16}$	9	3	0	10	2	0		$2\frac{1}{4}$	$9\frac{1}{2}$	75	7	—	—	5	—	225 and under 262	*e* 6150 and under 6840
f	165	1	18	27	84	0	17	45	$\frac{11}{16}$	10	3	19	11	3	19		$2\frac{3}{4}$	$15\frac{1}{2}$	75	$7\frac{1}{2}$	—	—	$5\frac{1}{2}$	—	262 and under 300	*f* 6840 and under 7490
g	165	$1\frac{1}{16}$	$20\frac{3}{10}$	$30\frac{4}{10}$	95	1	9	60	$\frac{11}{16}$	14	2	7	15	3	7		$2\frac{3}{4}$	$15\frac{1}{2}$	75	$7\frac{1}{2}$	—	—	$5\frac{1}{2}$	—	300 and under 375	*g* 7490 and under 8670
h	195	$1\frac{2}{16}$	$22\frac{3}{4}$	$34\frac{1}{8}$	126	1	0	60	$\frac{12}{16}$	17	1	3	18	3	3		$2\frac{3}{4}$	$15\frac{1}{2}$	75	8	—	—	6	—	375 and under 450	*h* 8670 and under 9770
i	195	$1\frac{3}{16}$	$25\frac{3}{8}$	38	141	0	16	60	$\frac{13}{16}$	20	1	11	22	0	11		3	18	75	$8\frac{1}{2}$	—	—	$6\frac{1}{2}$	—	450 and under 525	*i* 9770 and under 10790
j	210	$1\frac{4}{16}$	$28\frac{1}{8}$	$42\frac{1}{8}$	168	0	0	60	$\frac{13}{16}$	20	1	11	22	0	11		3	18	75	$8\frac{1}{2}$	—	—	$6\frac{1}{2}$	4	525 and under 600	*j* 10790 and under 11740
k	210	$1\frac{5}{16}$	31	$46\frac{1}{2}$	185	2	12	60	$\frac{14}{16}$	23	1	17	25	1	17		$3\frac{1}{4}$	22	90	9	—	—	7	5	600 and under 675	*k* 11740 and under 12620
l	210	$1\frac{6}{16}$	34	51	203	0	18	60	$\frac{14}{16}$	23	1	17	25	1	17		$3\frac{1}{4}$	22	90	9	—	—	7	5	675 and under 750	*l* 12620 and under 13450
m	210	$1\frac{7}{16}$	$37\frac{1}{8}$	$55\frac{5}{8}$	222	1	17	60	$\frac{15}{16}$	27	0	9	29	0	9		$3\frac{1}{2}$	26	90	$9\frac{1}{2}$	—	—	$7\frac{1}{2}$	$5\frac{1}{2}$	750 and under 900	*m* 13450 and under 15120
n	210	$1\frac{8}{16}$	$40\frac{5}{10}$	$58\frac{7}{10}$	242	0	5	75	$\frac{15}{16}$	33	3	11	36	1	11		$3\frac{1}{2}$	26	90	10	$3\frac{1}{4}$	22	8	$5\frac{1}{2}$	900 and under 1050	*n* 15120 and under 16720
o	240	$1\frac{9}{16}$	$43\frac{9}{10}$	$61\frac{4}{10}$	298	2	19	75	1	38	1	0	41	1	0		$3\frac{3}{4}$	29	90	10	$3\frac{1}{4}$	22	8	6	1050 and under 1200	*o* 16720 and under 18260
p	240	$1\frac{10}{16}$	$47\frac{5}{10}$	$66\frac{5}{10}$	319	1	17	75	1	38	1	0	41	1	0		$3\frac{3}{4}$	29	90	10	$3\frac{1}{4}$	22	$8\frac{1}{2}$	6	1200 and under 1350	*p* 18260 and under 19780
q	240	$1\frac{11}{16}$	$51\frac{1}{4}$	$71\frac{3}{4}$	344	2	22	75	$1\frac{1}{16}$	43	1	9	46	1	9		4	33	90	11	$3\frac{1}{2}$	26	9	7	1350 and under 1500	*q* 19780 and under 21280
r	240	$1\frac{12}{16}$	$55\frac{1}{8}$	$77\frac{1}{8}$	370	1	22	75	$1\frac{1}{16}$	43	1	9	46	1	9		4	33	90	11	$3\frac{1}{2}$	26	9	$7\frac{1}{2}$	1500 and under 1800	*r* 21280 and under 24220
s	240	$1\frac{13}{16}$	$59\frac{1}{8}$	$82\frac{3}{4}$	397	3	6	75	$1\frac{2}{16}$	48	2	6	52	0	6		$4\frac{1}{4}$	35	90	12	4	33	$9\frac{1}{2}$	$7\frac{1}{2}$	1800 and under 2100	*s* 24220 and under 27140
t	240	$1\frac{14}{16}$	$63\frac{1}{4}$	$88\frac{5}{10}$	425	1	0	75	$1\frac{2}{16}$	48	2	6	52	0	6		$4\frac{1}{4}$	35	100	12	4	33	$9\frac{1}{2}$	8	2100 and under 2400	*t* 27140 and under 30020
u	270	$1\frac{15}{16}$	$67\frac{5}{10}$	$94\frac{5}{10}$	511	1	14	90	$1\frac{2}{16}$	58	1	2	62	1	2		$4\frac{1}{4}$	35	100	12	4	33	10	$8\frac{1}{2}$	2400 and under 2700	*u* 30020 and under 32820
v	270	2	72	$100\frac{8}{10}$	538	3	0	90	$1\frac{3}{16}$	65	0	16	69	2	16		$4\frac{1}{2}$	39	120	12	4	33	10	$8\frac{1}{2}$	2700 and under 3000	*v* 32820 and under 35450
w	270	$2\frac{1}{16}$	$76\frac{5}{10}$	$107\frac{1}{10}$	573	2	14	90	$1\frac{3}{16}$	65	0	16	69	2	16		$4\frac{1}{2}$	39	120	13	$4\frac{1}{2}$	39	10	9	3000 and under 3500	*w* 35450 and under 39600
x	270	$2\frac{2}{16}$	$81\frac{1}{4}$	$113\frac{3}{4}$	608	2	14	90	$1\frac{3}{16}$	65	0	16	69	2	16		$4\frac{1}{2}$	39	120	13	$4\frac{1}{2}$	39	11	9	3500 and under 4000	*x* 39600 and under 43600
y	270	$2\frac{3}{16}$	$86\frac{1}{8}$	$120\frac{5}{10}$	645	3	0	90	$1\frac{4}{16}$	72	0	0	77	0	0		$4\frac{3}{4}$	47	120	14	$4\frac{3}{4}$	47	12	10	4000 and under 4500	*y* 43600 and under 47400
z	270	$2\frac{4}{16}$	$91\frac{1}{8}$	$127\frac{5}{10}$	682	1	11	90	$1\frac{4}{16}$	72	0	0	77	0	0		$4\frac{3}{4}$	47	120	14	5	59	12	10	4500 and under 5000	*z* 47400 and under 51000
a†	270	$2\frac{5}{16}$	$96\frac{1}{4}$	$134\frac{3}{4}$	720	3	4	90	$1\frac{5}{16}$	79	2	5	85	0	5		5	59	120	15	$5\frac{1}{4}$	65	12	10	5000 and under 5500	*a*†51000 and under 55000
b†	300	$2\frac{6}{16}$	$101\frac{1}{2}$	$142\frac{1}{10}$	844	1	0	120	$1\frac{5}{16}$	106	0	7	113	1	7		5	59	130	15	$5\frac{1}{2}$	71	13	11	5500 and under 6000	*b*†55000 and under 59000
c†	300	$2\frac{7}{16}$	$106\frac{9}{10}$	$149\frac{5}{8}$	890	1	4	120	$1\frac{5}{16}$	106	0	7	113	1	7		5	59	130	15	$5\frac{3}{4}$	78	13	11	6000 and under 6500	*c*†59000 and under 63000
d†	300	$2\frac{8}{16}$	$112\frac{1}{2}$	$157\frac{5}{10}$	936	0	3	120	$1\frac{6}{16}$	116	0	10	124	0	10		$5\frac{1}{4}$	65	130	16	6	85	13	11	6500 and under 7000	*d*†63000 and under 70000

Equipment for SAILING AND STEAM TRAWLERS.

Registered U.D. Tonnage.		Anchors.				Chain (e) (f) (h).								Hawsers.		Warps.	
								Minimum Weight.									
								Stud Link.			Short Link.						
Sailing Trawlers.	Steam Trawlers.	No.	1st.	2nd.	3rd.	Length	Diameter							Length	Size.	Length	Size.
			Cwts. ex. Stock.	Cwts. ex. Stock.	Cwts. ex. Stock.	Fathms.	Inches.	Cwts.	qrs.	lbs.	Cwts.	qrs.	lbs.	Fathms.	Ins.	Fathms.	Ins.
50 and under 65	65 and under 80	3	3	3	$1\frac{3}{4}$	60	$\frac{12}{16}$	17	1	3	18	3	3	60	5	60	$2\frac{1}{2}$
65 and under 80	80 and under 100	3	$3\frac{1}{2}$	$3\frac{1}{2}$	2	60	$\frac{13}{16}$	20	1	11	22	0	11	60	$5\frac{1}{2}$	60	3
80 and under 100	100 and under 120	3	4	4	$2\frac{1}{4}$	60	$\frac{14}{16}$	23	1	17	25	1	17	60	$5\frac{1}{2}$	60	3
100 and under 120	120 and under 140	3	$4\frac{1}{4}$	4	$2\frac{1}{2}$	60	$\frac{14}{16}$	23	1	17	25	1	17	60	$5\frac{1}{2}$	60	$3\frac{1}{2}$
120 and under 140	140 and under 160	3	$4\frac{1}{2}$	4	$2\frac{1}{2}$	75	$\frac{15}{16}$	33	3	11	36	1	11	60	$5\frac{1}{2}$	60	$3\frac{1}{2}$
140	160 and under 180	3	$4\frac{3}{4}$	$4\frac{1}{4}$	$2\frac{1}{2}$	90	$\frac{15}{16}$	40	2	13	43	2	13	60	$5\frac{1}{2}$	60	4

The Anchors and Chains to be tested at a Public Testing Machine in accordance with the statutory tests.

The following Machines are recognised by the Committee of Lloyd's Register for the Testing of Anchors and Chains while licensed by the Board of Trade for that purpose—

London—Trinity Proving House.............................Superintendent, Mr. L. R. Isitt.
Closed May, 1875.
*Netherton—Lloyd's Proving House .... ditto Mr. H. Green.
Assistant ditto Mr. W. J. Relf.
*Tipton—Lloyd's Proving House .... ditto Mr. C. E. Perrins.
Assistant ditto
*Low Walker—Lloyd's Proving House .... ditto Mr. T. Tindale.
*Chester (Saltney)—Lloyd's Proving House.............. ditto Mr. A. S. Jack.
Assistant ditto Mr. J. Littler.
*Glasgow—Lloyd's Proving House .... ditto Mr. E. Seedhouse.
*Cardiff—Lloyd's Proving House .... ditto Mr. G. W. Penn.
Sunderland—River Wear Commission, Public Test...... ditto Mr. H. T. Welford.

And any other Machine will be recognised by the Committee which is or may be hereafter duly licensed by the Board of Trade for the purpose of testing Anchors and Chains.

N.B.—Vessels supplied with Anchors and Chain Cables tested at any of the Proving Machines marked with an asterisk (*) in the above list, will have the notation of "L.A.&C.P." in the Register Book, signifying that the Anchors and Chain Cables have been tested at a machine under the control of the Committee of Lloyd's Register of Shipping.

The following Proving Establishments have been recognised by the Committee for the testing of Anchors and Chain Cables supplied to foreign owned vessels (*see* Section 39 of the Rules.)

Denmark .... Government Establishment at Copenhagen.
France .... E. Turbot, Anzin (Nord).
" .... Chantiers de la Loire, Nantes.
" .... Vve. E. Couillard, Succr., Havre.
" .... Dorémieux, Fils et Cie., St. Amand.
" .... E. Davaine, St. Amand les Eaux (Nord).
Germany .... Hochfelder Walzwerk, Duisberg.
Holland .... Koninklijke Nederlandsche Grofsmederij at Leyden.
Sweden .... Comptoir des Forges at Liljeholmen, near Stockholm.
United States......... Messrs. Bradlee & Co.'s Works at Philadelphia.
" " .... Lebanon Chain Works, Lebanon, Pensylvania.
" " .... The Logan Iron and Steel Co. of Burnham, Pennsylvania.

N.B.—The Italic letters preceding the Equipment numbers correspond with letters printed in the seventh column in the List of Steam Vessels in the Register Book to indicate the Equipment numbers of vessels per this Table.

(a) By Section 39 of the Rules for the building and classification of Iron and Steel Vessels, it is provided that the equipment is to be regulated by the number produced by the sum of the measurements of the half-moulded breadth of the vessel at the middle of the length, the depth from the upper part of keel to the top of the upper deck beams, with the normal round up, and the girth of the half-midship frame section of the vessel, measured from the centre line at top of the keel to the upper deck stringer plate, multiplied by the length of the vessel, for a one, two, and three-decked vessel, and for a spar-decked vessel.

For a vessel having a complete awning-deck or a continuous shade deck, the equipment number is to be increased one-eighth beyond what it would be if the vessel were flush-decked.

For a vessel with a partial awning-deck, poop, topgallant forecastle, bridge-house, or a raised quarter-deck, the equipment number is to be increased beyond that for a flush or spar-deck vessel by that proportion of the addition made for a complete awning-deck which the combined length of the erections bears to the length of the vessel.

To entitle vessels classed A "For Channel Purposes" to the Figure 1, the equipment of Anchors and Chain Cables, etc., should be as required by Table 22, with the exception that not more than two bower anchors and one stream anchor need be supplied. The first bower anchor should be of the full weight required by the table, and the second bower may be 15 per cent. lighter. This rule, however, applies only to vessels intended for short passages. In vessels classed "For Channel Purposes," which are intended for longer voyages, such as the Queenboro' and Flushing, the Channel Islands or the Irish Sea service, the equipment must be in accordance with the requirements of Table 22.

Lloyd's Register of Shipping, 2, White Lion Court, Cornhill.
8th April, 1897.

(b) In order to meet the requirements of different trades, the weights of Anchors as given in the above Table may be modified as under:—
Where two Bower Anchors only are required, one of them may be $7\frac{1}{2}$ per cent. lighter than the weight set forth above, provided the collective weight of the two Anchors is equal to that given in the Table.
Where three Bower Anchors are required, one of them may be 15 per cent., and another $7\frac{1}{2}$ per cent. lighter than the weight set forth above, provided the collective weight of the three Anchors is equal to that given in Table, but in no case may the best Bower be lighter than prescribed in Table, nor the third Bower be lighter than is allowed by this footnote.
Where four Bower Anchors are required, one may be 15 per cent., and another $7\frac{1}{2}$ per cent. lighter than the weight set forth above, provided the collective weight of the four Anchors is equal to that given in the Table, but two at least of the Bower Anchors must not be lighter than required by the Table.
All Anchor Stocks must be of acknowledged and approved description, and be one-fourth the weight of the anchor given in the Table.
The heads of Stockless anchors should not be less than three-fifths of the total weight of the Anchor.

(c) Stockless Stream and Kedge Anchors.—In the case of Stockless Stream and Kedge Anchors, an addition to the weight specified in this Table must be made of one-fourth to compensate for the deficiency in weight consequent on the absence of stock.

* The tests of anchors in this Table are approximate tests; or as near the Statutory tests as can be expressed in tons and aliquot parts of tons.

Tests for Cast Steel Anchors, *see* Notice No. 647 at end of the Rules.

(d) All Anchors, including Stream and Kedge Anchors, exceeding 168lbs. in weight, ex. Stock, to be Tested according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(e) The Chain Cables and Stream Chains to be tested in all cases according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(f) There should be included in the above weights, 2 End Shackles to each Cable; that is 4 for each outfit, which contains two Cables.

(g) There should be included in the above weights, 2 End Shackles to each Stream Chain.

(h) Unstudded close-link Chains will be admitted as Cables, if proved to *two-thirds* the Test required for Stud-link Chains for the *tensile* strain, and 100 per cent. above the *tensile* strain for the breaking strain.

(i) When steel wire Towlines or Hawsers are adopted, see note i on the other side of this Table.
Where a departure from the requirements of the Table for Hawsers and Warps is proposed by an Owner the same should be in all cases submitted in the first place for the consideration of the Committee.

Tabl

Tables
1 to 12

STEEL VESSELS.

Table of Minimum Dimensions of FRAMES,

NUMBERS. For Frames, Reversed Frames, Bulkheads, and Pillars. *(See Section 2.)*	SPACING OF FRAMES.	FRAMES. Dimensions of angles for three-fifths the length of vessel amidships, and bulkheads.	FRAMES. Dimensions of angles before and abaft the three-fifths length.	Reversed Frames. Dimensions of Reversed angles all fore and aft.	Dimensions of Z and Channel bar Frames for three-fifths length amidships.	DEEP FRAMING. *(See Section 14b.)** Depth of Framing.	DEEP FRAMING. Width of Stringers.	DEEP FRAMING. Angles on Stringers.
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
31 and under 37	20	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{5}{20}$	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{5}{20}$	$2\frac{1}{4} \times 2\frac{1}{4} \times \frac{5}{20}$	...	...	...	...
37 and under 45	21	$3 \times 2\frac{1}{2} \times \frac{5}{20}$	$3 \times 2\frac{1}{2} \times \frac{5}{20}$	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{5}{20}$	...	...	...	...
45 and under 52	21	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{5}{20}$	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{5}{20}$	...	...	...	...
52 and under 57	22	$3\frac{1}{2} \times 3 \times \frac{6}{20}$	$3\frac{1}{2} \times 3 \times \frac{5}{20}$	$3 \times 2\frac{1}{2} \times \frac{5}{20}$	$3\frac{1}{2} \times 3 \times 3 \times \frac{7}{20}$	$5\frac{1}{2}$	14	$4 \times 3\frac{1}{2} \times \frac{7}{20}$
57 and under 61	22	$3\frac{1}{2} \times 3 \times \frac{7}{20}$	$3\frac{1}{2} \times 3 \times \frac{6}{20}$	$3 \times 2\frac{1}{2} \times \frac{6}{20}$	$3\frac{1}{2} \times 3 \times 3 \times \frac{8}{20}$	$5\frac{1}{2}$	15	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$
61 and under 65	23	$4 \times 3 \times \frac{7}{20}$	$4 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$	$4 \times 3 \times 3 \times \frac{8}{20}$	6	16	$4\frac{1}{2} \times 4 \times \frac{7}{20}$
65 and under 68	23	$4 \times 3 \times \frac{7}{20}$	$4 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{7}{20}$	$4 \times 3 \times 3 \times \frac{8}{20}$	$6\frac{1}{2}$	17	$4\frac{1}{2} \times 4 \times \frac{8}{20}$
68 and under 71	23	$4\frac{1}{2} \times 3 \times \frac{7}{20}$	$4\frac{1}{2} \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{7}{20}$	$4\frac{1}{2} \times 3 \times 3 \times \frac{8}{20}$	7	18	$5 \times 4 \times \frac{9}{20}$
71 and under 73	24	$4\frac{1}{2} \times 3 \times \frac{8}{20}$	$4\frac{1}{2} \times 3 \times \frac{7}{20}$	$3 \times 3 \times \frac{7}{20}$	$4\frac{1}{2} \times 3 \times 3 \times \frac{9}{20}$	7	20	$5\frac{1}{2} \times 4 \times \frac{9}{20}$
73 and under 76	24	$5 \times 3 \times \frac{8}{20}$	$5 \times 3 \times \frac{7}{20}$	$3 \times 3 \times \frac{7}{20}$	$5 \times 3 \times 3 \times \frac{9}{20}$	$7\frac{1}{2}$	20	$5\frac{1}{2} \times 4 \times \frac{9}{20}$
76 and under 80	24	$5 \times 3 \times \frac{8}{20}$	$5 \times 3 \times \frac{7}{20}$	$3\frac{1}{2} \times 3 \times \frac{8}{20}$	$5 \times 3 \times 3 \times \frac{10}{20}$	$7\frac{1}{2}$	21	$6 \times 4 \times \frac{9}{20}$
80 and under 85	24	$5 \times 3\frac{1}{2} \times \frac{8}{20}$	$5 \times 3\frac{1}{2} \times \frac{7}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$5 \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$	8	21	$6\frac{1}{2} \times 4 \times \frac{9}{20}$
85 and under 91	24	$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$4 \times 3\frac{1}{2} \times \frac{8}{20}$	$5\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$	$8\frac{1}{2}$	22	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{20}$
91 and under 97	24	$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$	$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$4 \times 3\frac{1}{2} \times \frac{9}{20}$	$5\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{11}{20}$	9	23	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$
97 and under 103	25	$6 \times 3\frac{1}{2} \times \frac{10}{20}$	$6 \times 3\frac{1}{2} \times \frac{9}{20}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$	$6 \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{12}{20}$	$9\frac{1}{2}$	24	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$
103 and under 109	25	$6 \times 3\frac{1}{2} \times \frac{10}{20}$	$6 \times 3\frac{1}{2} \times \frac{9}{20}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$	$6\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{12}{20}$	...	...	...
109 and under 115	26	$6\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$	$6\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$	$4\frac{1}{2} \times 4 \times \frac{10}{20}$	$7 \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{12}{20}$	...	...	...
115 and under 122	26	$7 \times 3\frac{1}{2} \times \frac{10}{20}$	$6\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$	$4\frac{1}{2} \times 4 \times \frac{10}{20}$	$7\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{12}{20}$	...	...	...
122 and under 130	27	$7 \times 3\frac{1}{2} \times \frac{11}{20}$	$6\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$	$4\frac{1}{2} \times 4 \times \frac{10}{20}$	$7\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2} \times \frac{13}{20}$	...	...	...

MEMO.:—Wider spacing than the above may be adopted provided the

The thickness given for Channel or Z Sections is to

* When deep framing is adopted in vessels over $32\frac{1}{2}$ feet from top of keel to top of

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Bulkheads.		Diameter of Solid pillars, and diameter and thickness of hollow malleable pillars to beams.			
		Solid Pillars.		Hollow malleable Pillars.	
Lower Half.	Upper Half.	Hold.	'Tween dk. poop, bridge, and forecastle.	Hold.	'Tween deck poop, bridge, and forecastle.
inches.	inches.	inches.	inches.	inches.	inches.
5/20	5/20	...	2¼	...	3 × 5/16
5/20	5/20	...	2½	...	3¼ × 5/16
5/20	5/20	2½	2⅜	3¼ × 6/16	3¼ × 5/16
6/20	5/20	2⅝	2⅜	3½ × 6/16	3¼ × 5/16
6/20	5/20	2¾	2½	3¾ × 6/16	3¼ × 6/16
6/20	6/20	2⅞	2½	3⅞ × 6/16	3¼ × 6/16
6/20	6/20	3	2½	4 × 6/16	3¼ × 6/16
6/20	6/20	3⅛	2⅝	4 × 7/16	3½ × 6/16
6/20	6/20	3¼	2⅝	4⅛ × 7/16	3½ × 6/16
6/20	6/20	3⅜	2⅝	4¼ × 7/16	3½ × 6/16
7/20	6/20	3½	2¾	4½ × 7/16	3¾ × 6/16
7/20	6/20	3⅝	2¾	4¾ × 7/16	3¾ × 6/16
7/20	6/20	3⅝	2¾	4¾ × 7/16	3¾ × 6/16
7/20	6/20	3¾	2⅞	5 × 7/16	3⅞ × 6/16
8/20	7/20	3¾	2⅞	5 × 7/16	3⅞ × 6/16
8/20	7/20	4	3	5½ × 7/16	4 × 6/16
8/20	7/20	4¼	3	5¾ × 7/16	4 × 6/16
8/20	7/20	4½	3¼	6 × 7/16	4⅛ × 7/16
8/20	7/20	4¾	3¼	6 × 8/16	4⅛ × 7/16

TABLE FOR SIZES OF FLOORS.

Floor plates in engine space of steam vessels to be 1/20 of an inch thicker, and in the boiler space 2/20 of an inch thicker than in this Table.

NUMBERS FOR FLOORS. (*See Section 2*)	For three-fifths length amidships.	Thickness at Ends.	NUMBERS FOR FLOORS—cont. (*See Section 2.*)	For three-fifths length amidships.	Thickness at Ends.
	inches.	inches.		inches.	inches.
31 and under 32	9 × 5/20	5/20	67 and under 68	20½ × 8/20	7/20
32 and under 33	9½ × 5/20	5/20	68 and under 69	21 × 8/20	7/20
33 and under 34	10 × 5/20	5/20	69 and under 70	21 × 9/20	7/20
34 and under 35	10½ × 5/20	5/20	70 and under 71	21½ × 9/20	7/20
35 and under 37	11 × 5/20	5/20	71 and under 72	22 × 9/20	7/20
37 and under 39	11½ × 5/20	5/20	72 and under 73	22½ × 9/20	7/20
39 and under 41	12 × 5/20	5/20	73 and under 74	23 × 9/20	7/20
41 and under 43	12 × 6/20	5/20	74 and under 76	23½ × 9/20	7/20
43 and under 45	12½ × 6/20	5/20	76 and under 78	24 × 9/20	7/20
45 and under 47	13 × 6/20	5/20	78 and under 80	24 × 10/20	8/20
47 and under 49	13½ × 6/20	5/20	80 and under 84	24½ × 10/20	8/20
49 and under 51	14 × 6/20	5/20	84 and under 88	25 × 10/20	8/20
51 and under 52	14½ × 6/20	5/20	88 and under 90	26 × 10/20	8/20
52 and under 53	15 × 6/20	5/20	90 and under 92	27 × 10/20	8/20
53 and under 55	15½ × 6/20	5/20	92 and under 95	28 × 10/20	8/20
55 and under 56	15½ × 7/20	6/20	95 and under 98	29 × 10/20	8/20
56 and under 57	16 × 7/20	6/20	98 and under 101	30 × 10/20	8/20
57 and under 58	16½ × 7/20	6/20	101 and under 105	31 × 10/20	8/20
58 and under 59	17 × 7/20	6/20	105 and under 108	32 × 10/20	8/20
59 and under 60	17½ × 7/20	6/20	108 and under 110	33 × 10/20	8/20
60 and under 62	17½ × 8/20	7/20	110 and under 113	34 × 10/20	8/20
62 and under 63	18 × 8/20	7/20	113 and under 116	35 × 10/20	8/20
63 and under 64	18½ × 8/20	7/20	116 and under 120	36 × 10/20	8/20
64 and under 65	19 × 8/20	7/20	120 and under 125	37 × 10/20	8/20
65 and under 66	19½ × 8/20	7/20	125 and under 130	38 × 10/20	8/20
66 and under 67	20 × 8/20	7/20			

framing and plating be increased in size to the satisfaction of the Committee.

be the minimum thickness of both webs and flanges.

upper deck beams, plans are to be specially submitted for the consideration of the Committee.

STEEL VESSELS.

Table of Minimum Dimensions of KEELS, STEMS,

NUMBERS. For Keel, Stem, Sternpost, and Plating. *(See Section 2.)*	Bar Keels for All Grades.	Stem of Sailing Vessels, and Steamers, and Sternpost of Sailing Vessels and Paddle Steamers.	Stern frames of Screw Steamers.	THICKNESS OF: Flat Plate Keels for all grades, breadth, and thickness. Three-fifths length amidships.	Flat Plate Keels: Ends.	Garboard Strakes, breadth and thickness. 100A: Half length amidships	100A: Ends.	90A: Half length amidships.	90A: Ends.
	inches.	inches.	inches.	inches.					
2600 and under 3300	$6 \times 1\frac{1}{8}$	$5\frac{1}{2} \times 1\frac{1}{8}$	$5\frac{1}{4} \times 2\frac{1}{4}$	30×8	6	30×6	6	30×6	6
3300 and under 4200	$6\frac{1}{2} \times 1\frac{1}{8}$	$5\frac{3}{4} \times 1\frac{1}{8}$	$5\frac{3}{4} \times 2\frac{1}{2}$	30×8	6	30×7	7	30×6	6
4200 and under 5100	$6\frac{3}{4} \times 1\frac{1}{4}$	$6 \times 1\frac{1}{4}$	$6 \times 2\frac{1}{2}$	30×9	7	30×7	7	30×6	6
5100 and under 6000	$7 \times 1\frac{3}{8}$	$6 \times 1\frac{3}{8}$	6×3	31×9	8	31×8	8	31×7	7
6000 and under 6900	$7 \times 1\frac{1}{2}$	$6\frac{1}{4} \times 1\frac{1}{2}$	$6\frac{1}{4} \times 3$	31×10	8	31×8	8	31×7	7
6900 and under 7700	$7 \times 1\frac{5}{8}$	$6\frac{1}{4} \times 1\frac{5}{8}$	$6\frac{1}{2} \times 3\frac{1}{4}$	31×11	8	31×9	8	31×8	8
7700 and under 8500	$7 \times 1\frac{3}{4}$	$6\frac{1}{2} \times 1\frac{3}{4}$	$6\frac{1}{2} \times 3\frac{1}{2}$	31×12	9	31×9	8	31×8	8
8500 and under 9300	$7\frac{1}{4} \times 1\frac{7}{8}$	$6\frac{1}{2} \times 1\frac{7}{8}$	$6\frac{1}{2} \times 3\frac{3}{4}$	32×12	9	32×9	8	32×8	8
9300 and under 10100	$7\frac{1}{2} \times 1\frac{7}{8}$	$6\frac{3}{4} \times 1\frac{7}{8}$	$6\frac{3}{4} \times 4$	32×12	9	32×9	8	32×8	8
10100 and under 10900	$7\frac{1}{2} \times 2$	$6\frac{3}{4} \times 2$	$6\frac{3}{4} \times 4\frac{1}{4}$	32×12	9	32×9	8	32×8	8
10900 and under 11600	$7\frac{1}{2} \times 2\frac{1}{8}$	$7 \times 2\frac{1}{8}$	$7 \times 4\frac{1}{4}$	33×12	9	33×9	8	33×8	8
11600 and under 12400	$7\frac{1}{2} \times 2\frac{1}{4}$	$7 \times 2\frac{1}{4}$	$7 \times 4\frac{1}{2}$	33×12	9	33×10	9	33×9	8
12400 and under 13100	$8 \times 2\frac{1}{4}$	$7 \times 2\frac{1}{4}$	$7 \times 4\frac{3}{4}$	33×13	10	33×10	9	33×9	8
13100 and under 13900	$8 \times 2\frac{1}{4}$	$7 \times 2\frac{1}{4}$	$7\frac{1}{4} \times 4\frac{3}{4}$	34×13	10	34×10	9	34×9	8
13900 and under 14700	$8 \times 2\frac{3}{8}$	$7\frac{1}{4} \times 2\frac{3}{8}$	$7\frac{1}{2} \times 4\frac{3}{4}$	34×14	11	34×11	10	34×10	9
14700 and under 15600	$8 \times 2\frac{3}{8}$	$7\frac{1}{2} \times 2\frac{3}{8}$	$8 \times 4\frac{3}{4}$	35×14	11	35×11	10	35×10	9
15600 and under 16600	$8\frac{1}{2} \times 2\frac{3}{8}$	$8 \times 2\frac{3}{8}$	8×5	36×14	11	36×11	10	36×10	9
16600 and under 17600	$9 \times 2\frac{3}{8}$	$8\frac{1}{2} \times 2\frac{3}{8}$	$8\frac{1}{2} \times 5$	36×14	11	36×11	10	36×10	9
17600 and under 18700	$9 \times 2\frac{1}{2}$	$8\frac{1}{2} \times 2\frac{1}{2}$	$8\frac{1}{2} \times 5$	36×16	12	36×12	11	36×11	10

OUTSIDE PLATING IN $\frac{1}{20}$THS. OF AN INCH.

From Garboard to the lower edge of Sheerstrake.*				Sheerstrakes for all grades, breadth, and thickness.		From main to upper Sheerstrake in Spar-decked vessels.		Spar deck Sheerstrake, breadth and thickness.		Awning deck and Bridge Side Plating, also Poops, and Forecastles.
100A		90A								
Half length amidships.	Ends.	Half length amidships.	Ends.	Half length amidships.	Ends.	Half length amidships.	Ends.	Half length amidships.	Ends.	
5 & 6	5	5	5	30 × 6	5	...	...	...	...	...
6	5	5 & 6	5	30 × 7	6	...	...	...	...	...
6 (*a*)	5	5 & 6 (*a*)	5	31 × 7	6	...	...	...	...	...
6 & 7	5 & 6	6	5	31 × 8	7	...	...	...	...	...
6 & 7 (*a*)	5 & 6	6 (*a*)	5	32 × 8	7	...	...	...	...	...
7	6	6 & 7	5 & 6	32 × 9	8	...	...	...	...	...
7 (*a*)	6	6 & 7 (*a*)	5 & 6	33 × 9	8	...	...	...	...	...
7 & 8	6 & 7	7	6	33 × 10	8	...	...	...	...	...
7 & 8 (*b*)	6 & 7	7 (*b*)	6	34 × 10	8	...	...	...	...	...
8	7	7 & 8	6 & 7	34 × 10	8	...	...	...	...	5
8 (*b*)	7	7 & 8 (*b*)	6 & 7	35 × 10	8	...	...	...	...	5
8 & 9	7 & 8	8	7	35 × 10	8	...	...	...	...	5
8 & 9 (*b*)	7 & 8	8 (*b*)	7	36 × 10	8	...	...	...	...	5
9	8	8 & 9	7 & 8	36 × 11	9	7	6	36 × 9	8	6
9 (*b*)	8	8 & 9 (*b*)	7 & 8	38 × 11	9	7	6	38 × 9	8	6
9 & 10	8	9	8	38 × 11	9	7	6	38 × 9	8	6
9 & 10 (*b*)	8	9 (*b*)	8	40 × 12	9	8	7	40 × 10	8	6
10	8	9 & 10	8	40 × 12	9	8	7	40 × 10	8	6
10 (*b*)	8	9 & 10 (*b*)	8	42 × 13	10	8	7	40 × 11	9	6

For foot notes—*see continuation.*

STEEL VESSELS.

Table of Minimum Dimensions of KEELS,

NUMBERS. For Keel, Stem, Sternpost, and Plating. *(See Section 2.)*	Bar Keels for All Grades.	Stem of Sailing Vessels, and Steamers, and Sternpost of Sailing Vessels and Paddle Steamers.	Stern frames of Screw Steamers.	THICKNESS OF — Flat Plate Keels for all grades, breadth, and thickness. Three-fifths length amidships.	Flat Plate Keels: Ends.	Garboard Strakes, breadth and thickness. 100A Half length amidships.	100A Ends.	90A Half length amidships.	90A Ends.
	inches.	inches.	inches.	inches.					
18700 and under 19900	$9\frac{1}{2} \times 2\frac{1}{2}$	$9 \times 2\frac{1}{2}$	9×5	36×16	12	36×12	11	...	...
19900 and under 21300	$9\frac{1}{2} \times 2\frac{1}{2}$	$9 \times 2\frac{1}{2}$	$9 \times 5\frac{1}{2}$	36×16	12	36×12	11	...	...
21300 and under 22900	$10 \times 2\frac{1}{2}$	$10 \times 2\frac{1}{2}$	$10 \times 5\frac{1}{2}$	36×16	12	36×12	11	...	...
22900 and under 24600	$10 \times 2\frac{5}{8}$	$10 \times 2\frac{5}{8}$	10×6	36×16	12	36×12	11	...	...
24600 and under 26500	$10 \times 2\frac{3}{4}$	$10 \times 2\frac{3}{4}$	10×6	36×16	12	36×12	11	...	...
26500 and under 28700	$10\frac{1}{2} \times 2\frac{3}{4}$	$10\frac{1}{2} \times 2\frac{3}{4}$	11×6	36×16	12	36×12	11	...	...
28700 and under 31200	$11 \times 2\frac{3}{4}$	$11 \times 2\frac{3}{4}$	$11 \times 6\frac{1}{2}$	36×17	13	36×13	12	...	...
31200 and under 33900	$11 \times 2\frac{7}{8}$	$11 \times 2\frac{7}{8}$	$11 \times 6\frac{3}{4}$	36×17	13	36×13	12	...	...
33900 and under 36800	11×3	11×3	11×7	36×18	14	36×14	13	...	...
36800 and under 40000	$11 \times 3\frac{1}{8}$	$11 \times 3\frac{1}{8}$	$11 \times 7\frac{1}{2}$	36×18	14	36×14	13	...	...
40000 and under 43400	$11\frac{1}{2} \times 3\frac{1}{8}$	$11\frac{1}{2} \times 3\frac{1}{8}$	$11\frac{1}{2} \times 7\frac{1}{2}$	36×18	14	36×14	13	...	...
43400 and under 47100	$12 \times 3\frac{1}{8}$	$12 \times 3\frac{1}{8}$	$12 \times 7\frac{3}{4}$	36×18	14	36×14	13	...	...
47100 and under 51000	$12 \times 3\frac{1}{4}$	$12 \times 3\frac{1}{4}$	$12\frac{1}{2} \times 7\frac{3}{4}$	36×20	15	36×15	14	...	...
51000 and under 55200	$12 \times 3\frac{3}{8}$	$12 \times 3\frac{3}{8}$	13×8	36×20	15	36×15	14	...	...
55200 and under 59700	$12 \times 3\frac{1}{2}$	$12 \times 3\frac{1}{2}$	$13 \times 8\frac{1}{2}$	36×20	15	36×15	14	...	...
59700 and under 64600	$12 \times 3\frac{5}{8}$	$12 \times 3\frac{5}{8}$	13×9	36×20	15	36×15	14	...	...
64600 and under 70000	$12 \times 3\frac{3}{4}$	$12 \times 3\frac{3}{4}$	$13 \times 9\frac{1}{2}$	36×21	16	36×16	15	...	...

MEM.—The Scantlings given in the above Table are intended for Vessels the length of which does not exceed *eleven times* their depth *from top of keel*, see Section 1. For Vessels which exceed this proportion, *see Section* 46 *and Table S* 6. For proportions of breadth to length, *see Table S* 5.

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29th November, 1888.

OUTSIDE PLATING IN $\frac{1}{20}$THS. OF AN INCH

From Garboard to the lower edge of Sheerstrake.*				Sheerstrakes for all grades, breadth, and thickness.		From main to upper Sheerstrake in Spar-decked vessels.		Spar deck Sheerstrake, breadth and thickness.		Awning deck and Bridge Side Plating, also Poops, and Forecastles.
100A		90A								
Half length amidships.	Ends.	Half length amidships.	Ends.	Half length amidships.	Ends.	Half length amidships.	Ends.	Half length amidships.	Ends.	
10 & 11	8 & 9	...	...	42 × 13	10	8	7	40 × 11	9	7
10 & 11 (*b*)	8 & 9	...	...	42 × 13	10	8	7	40 × 11	9	7
11	9	...	...	42 × 13	10	8	7	40 × 11	9	7
11 (*b*)	9	...	...	42 × 13	10	8	7	40 × 11	9	7
11 & 12	9	...	...	42 × 13	10	8	7	40 × 11	9	7
11 & 12 (*c*)	9	...	...	44 × 13	10	8	7	40 × 11	9	7
12	9	...	...	44 × 13	10	9	8	40 × 11	9	7
12 (*c*)	9	...	...	44 × 13	10	9	8	40 × 11	9	7
12 & 13	9 & 10	...	...	44 × 14	11	9	8	40 × 12	9	7
12 & 13 (*c*)	9 & 10	...	...	44 × 14	11	9	8	40 × 12	9	7
13	10	...	...	44 × 14	11	9	8	40 × 12	9	7
13 (*c*)	10	...	...	46 × 15	12	9	8	40 × 13	10	...
13 & 14	10 & 11	...	...	46 × 15	12	9	8	40 × 13	10	...
13 & 14 (*c*)	10 & 11	...	...	46 × 16	13	9	8	40 × 14	11	...
14	11	...	...	46 × 16	13	9	8	40 × 14	11	...
14 (*c*)	11	...	...	46 × 16	13	9	8	40 × 14	11	...
14 & 15	11 & 12	...	...	46 × 16	13	9	8	40 × 14	11	...

* In the columns for plating, where two thicknesses are given they are to be worked in alternate strakes, and the larger thickness is to apply to the outer strakes, and the smaller one to the inner strakes: and the size of the rivets and double riveting to be regulated by the thickness of the thicker plating.

(*a*). One strake at Bilge increased $\frac{1}{20}$ of an inch in thickness all fore and aft.

(*b*). Two strakes " " $\frac{1}{20}$ " " " " "

(*c*). Three " " $\frac{1}{20}$ " " " " "

STEEL VESSELS.

Table of Minimum Dimensions of KEELSONS, KEELSON AND

NUMBERS. To regulate keelsons stringers, decks, rudders, and ceiling. (*See Section* 2.)	Size of middle-line keelsons standing upon floors, and thickness of rider plate to keelson.		Thickness of intercostal keelson plates.	Dimensions of angle bars for keelsons, and stringers in hold, for all grades.	Dimensions of angle bar on the middle, lower or hold, and orlop beam stringer plates, on upper deck stringer plates in spar-decked, and awning-decked vessels.	Dimensions of angle bars on upper deck stringer plates.
	Half length amidships.	Thickness at ends.				
	inches.	inches.	inches.	inches.	inches.	inches.
Under 2800	$7\frac{1}{2} \times \frac{6}{20}$	$\frac{5}{20}$	$\frac{5}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 2\frac{1}{2} \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$
2800 and under 4100	$8\frac{1}{2} \times \frac{7}{20}$	$\frac{6}{20}$	$\frac{5}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$
4100 and under 5400	$9 \times \frac{8}{20}$	$\frac{7}{20}$	$\frac{5}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$
5400 and under 6700	$10 \times \frac{8}{20}$	$\frac{7}{20}$	$\frac{5}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$
6700 and under 7900	$11 \times \frac{9}{20}$	$\frac{7}{20}$	$\frac{6}{20}$	$3\frac{1}{2} \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{7}{20}$
7900 and under 9100	$12 \times \frac{9}{20}$	$\frac{7}{20}$	$\frac{6}{20}$	$3\frac{1}{2} \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{6}{20}$	$3 \times 3 \times \frac{7}{20}$
9100 and under 10300	$12 \times \frac{9}{20}$	$\frac{7}{20}$	$\frac{6}{20}$	$4 \times 3 \times \frac{6}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{6}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$
10300 and under 11400	$12 \times \frac{10}{20}$	$\frac{8}{20}$	$\frac{7}{20}$	$4\frac{1}{2} \times 3 \times \frac{7}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$
11400 and under 12600	$13 \times \frac{10}{20}$	$\frac{8}{20}$	$\frac{7}{20}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$4 \times 4 \times \frac{7}{20}$
12600 and under 13800	$14 \times \frac{11}{20}$	$\frac{9}{20}$	$\frac{7}{20}$	$5 \times 3\frac{1}{2} \times \frac{7}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$4 \times 4 \times \frac{8}{20}$
13800 and under 15100	$15 \times \frac{11}{20}$	$\frac{9}{20}$	$\frac{7}{20}$	$5 \times 3\frac{1}{2} \times \frac{8}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$4 \times 4 \times \frac{8}{20}$
15100 and under 16500	$16 \times \frac{12}{20}$	$\frac{10}{20}$	$\frac{8}{20}$	$5 \times 3\frac{1}{2} \times \frac{9}{20}$	$4 \times 4 \times \frac{8}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{20}$
16500 and under 18000	$17 \times \frac{12}{20}$	$\frac{10}{20}$	$\frac{8}{20}$	$5 \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{20}$
18000 and under 19700	$18 \times \frac{13}{20}$	$\frac{11}{20}$	$\frac{8}{20}$	$5\frac{1}{2} \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{20}$
19700 and under 21700	$19 \times \frac{13}{20}$	$\frac{11}{20}$	$\frac{8}{20}$	$5\frac{1}{2} \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{20}$
21700 and under 24100	$20 \times \frac{13}{20}$	$\frac{11}{20}$	$\frac{9}{20}$	$6 \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$
24100 and under 27000	$20 \times \frac{14}{20}$	$\frac{12}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$
27000 and under 30400	$22 \times \frac{14}{20}$	$\frac{12}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$
30400 and under 34300	$23 \times \frac{14}{20}$	$\frac{12}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{11}{20}$
34300 and under 38800	$25 \times \frac{14}{20}$	$\frac{12}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$	$4 \times 4 \times \frac{9}{20}$	$4\frac{1}{2} \times 4\frac{1}{2} \times \frac{11}{20}$
38800 and under 43900	$27 \times \frac{14}{20}$	$\frac{12}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$	$4 \times 4 \times \frac{9}{20}$	$5 \times 5 \times \frac{11}{20}$
43900 and under 49600	$29 \times \frac{14}{20}$	$\frac{13}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$	$4 \times 4 \times \frac{9}{20}$	$5 \times 5 \times \frac{11}{20}$
49600 and under 56000	$30 \times \frac{15}{20}$	$\frac{13}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$	$4 \times 4 \times \frac{9}{20}$	$5 \times 5 \times \frac{11}{20}$
56000 and under 63000	$32 \times \frac{15}{20}$	$\frac{13}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$	$4 \times 4 \times \frac{9}{20}$	$5 \times 5 \times \frac{11}{20}$
63000 and under 70000	$32 \times \frac{15}{20}$	$\frac{13}{20}$	$\frac{9}{20}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{20}$	$4 \times 4 \times \frac{9}{20}$	$5 \times 5 \times \frac{11}{20}$

MEM.—The Scantlings given in the above Table are intended for Vessels, the length of which does not exceed *eleven times*
For proportions of breadth

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[S]TRINGER ANGLES, DECKS, RUDDERS, AND CEILING.

RUDDER.*								Thickness of Upper deck and diameter of bolt fastenings of wood deck. (*a*)			Thickness of wood ceiling in hold, to upper part of bilges.
Sailing Vessels.				Steam Vessels. †							
[D]iam. [a]t the [h]ead.	Diam. of pintles.	Section of main piece at heel.	Th'ckness of single plate rudder in 20ths.	Diameter at the head.	Diameter of pintles.	Section of main piece at heel.	Thickness of single plate rudder in 20ths.	Wood deck.	Diam-eter of Bolts.	Steel Deck.	
[in]ches.	inches.	inches.		inches.	inches.	inches.		inches.	inches.	inches.	inches.
2⅞	2	2 × 2	9	3	2	2 × 2	10	2½	½	...	2
3	2	2 × 2	9	3½	2	2½ × 2	10	3	½	...	2
3¼	2	2 × 2	9	3¾	2¼	2½ × 2¼	10	3	½	...	2
3½	2	2½ × 2	9	4	2¼	2¾ × 2¼	10	3	½	6/20	2
3¾	2¼	2½ × 2¼	10	4¼	2½	2¾ × 2½	12	3½	9/16	6/20	2½
4	2¼	2¾ × 2¼	10	4½	2¾	3 × 2¾	12	3½	9/16	6/20	2½
4¼	2½	2¾ × 2½	11	4½	2¾	3 × 2¾	12	3½	9/16	6/20	2½
4½	2¾	3 × 2¾	11	4¾	2¾	3¼ × 2¾	12	3½	9/16	6/20	2½
4¾	2¾	3¼ × 2¾	12	5	3	3¼ × 3	15	3½	9/16	6/20	2½
5	3	3¼ × 3	13	5¼	3	3½ × 3	15	3½	9/16	6/20	2½
5¼	3	3½ × 3	13	5½	3	4 × 3	15	3½	9/16	6/20	2½
5½	3	4 × 3	14	5¾	3	4¼ × 3	15	4	5/8	6/20	2½
6	3	4¾ × 3	14	6¼	3¼	4¾ × 3¼	18	4	5/8	6/20	2½
6¼	3¼	4¾ × 3¼	16	7	3½	5½ × 3½	18	4	5/8	6/20	2½
6¾	3½	5 × 3½	16	7¼	3½	6 × 3½	18	4	5/8	6/20	2½
7	3½	5½ × 3½	16	7¾	3¾	6½ × 3¾	20	4	5/8	6/20	2½
7½	3¾	6 × 3¾	16	8	4	6½ × 4	20	4	5/8	6/20	2½
7½	3¾	6 × 3¾	16	8½	4¼	6¾ × 4¼	20	4	5/8	7/20	2½
8	4	6½ × 4	18	9	4½	7 × 4½	22	4	5/8	...	2½
8½	4½	6½ × 4½	18	9½	4¾	7½ × 4¾	22	4	5/8	...	2½
...	...	...	...	10	5	8 × 5	...	4	5/8	...	2½
...	...	...	...	10½	5¼	8¼ × 5¼	...	4	5/8	...	2½
...	...	...	...	10½	5¼	8¼ × 5¼	...	4	5/8	...	2½
...	...	...	...	11	5½	8½ × 5½	...	4	5/8	...	2½
...	...	...	...	11	5½	8½ × 5½	...	4	5/8	...	2½

[...]their depth *from top of keel, see Section* 1. *For Vessels which exceed this proportion, see Section* 46 *and Table S* 6, [...]*to length, see Table S* 5.

(*a*) When the deck is of Teak, it may be one-sixth less in thickness. Where a steel deck is substituted for a wood one, it is not to be less than as given above, and supported by beams as in the case of steel decks required by Table S 5. When the deck is of steel as required by the Rules, it is to be in thickness as given in Table S 5.

† "The diameters of rudder heads for Steam Vessels to be calculated by the following formula, but in no case is the diameter to be less than that given in the above Table:—

$$\text{“}d = \tfrac{1}{32}\sqrt[3]{D \times B^2 \times S^2}$$

"where D = feet draught, B = breadth of rudder in inches, and S = speed in knots."

* In cases of single plate rudders, the sectional area of mainpiece at heel to be one-third greater than given in the above Table.

STEEL VESSELS.

Length of Beam amidships.	Upper and Lower Deck Beams in one and two decked vessels, Main and Lower Deck Beams in "Three deck" and spar-decked Vessels, and Beams of raised quarter decks.				Upper Deck Beams in "Three-deck" Vessels. (*a*)				Size of Beams (*a*) and aft castl
	Size of Beams amidships.		Size of Beams less than three-fourths the length of the midship Beam.		Size of Beams amidships.		Size of Beams less than three-fourths the length of the midship Beam.		
Feet.	Bulb Plate. ins. ins.	Single Angle Bars. ins. ins. ins.	Bulb Plate. ins. ins.	Double Angle Bars. ins. ins. ins.	Bulb Plate. ins. ins.	Double Angle Bars. ins. ins. ins.	Bulb Plate. ins. ins.	Double Angle Bars. ins. ins. ins.	Bulb Plate. ins. ins.
16		4½ × 3 × 6/20							
18		5 × 3 × 7/20							
20	5 × 5/20 Sng. Ang. Bar	Double Angle Bars 2 × 2 × 5/20 5½ × 3 × 7/20							
22	5½ × 5/20	2½ × 2¼ × 5/20							
24	6 × 6/20	2½ × 2½ × 5/20	5½ × 5/20	2½ × 2½ × 5/20					
26	6½ × 6/20	2½ × 2½ × 6/20	6 × 6/20	2½ × 2½ × 6/20	6 × 6/20	2½ × 2½ × 5/20			5½ × 5/2
28	7 × 7/20	3 × 3 × 6/20	6½ × 6/20	3 × 3 × 6/20	6½ × 6/20	2½ × 2½ × 6/20	6 × 6/20	2½ × 2½ × 6/20	6 × 6/2
30	7½ × 7/20	3 × 3 × 6/20	7 × 7/20	3 × 3 × 6/20	7 × 7/20	2½ × 2½ × 6/20	6½ × 6/20	2½ × 2½ × 6/20	6½ × 6/2
32	8 × 8/20	3 × 3 × 6/20	7 × 7/20	3 × 3 × 6/20	7 × 7/20	3 × 3 × 6/20	6½ × 6/20	3 × 3 × 6/20	6½ × 6/2
34	8½ × 8/20	3 × 3 × 7/20	7½ × 7/20	3 × 3 × 7/20	7½ × 7/20	3 × 3 × 6/20	7 × 7/20	3 × 3 × 6/20	7 × 7/2
36	9 × 9/20	3½ × 3 × 7/20	8 × 8/20	3½ × 3 × 7/20	8 × 8/20	3 × 3 × 6/20	7½ × 7/20	3 × 3 × 6/20	7½ × 7/2
38	9½ × 9/20	3½ × 3½ × 7/20	8½ × 8/20	3½ × 3½ × 7/20	8½ × 8/20	3½ × 3 × 7/20	8 × 8/20	3½ × 3 × 7/20	8 × 8/2
40	10 × 10/20	3½ × 3½ × 7/20	9 × 9/20	3½ × 3½ × 7/20	9 × 9/20	3½ × 3 × 7/20	8½ × 8/20	3½ × 3 × 7/20	8½ × 8/2
42	10½ × 10/20	3½ × 3½ × 8/20	9 × 9/20	3½ × 3½ × 8/20	9½ × 9/20	3½ × 3½ × 7/20	9 × 9/20	3½ × 3½ × 7/20	9 × 8/2
44	11 × 10/20	3½ × 3½ × 8/20	9½ × 9/20	3½ × 3½ × 8/20	10 × 10/20	3½ × 3½ × 7/20	9½ × 9/20	3½ × 3½ × 7/20	9½ × 9/2
46	11½ × 10/20	3½ × 3½ × 8/20	10 × 10/20	3½ × 3½ × 8/20	10 × 10/20	3½ × 3½ × 8/20	9½ × 9/20	3½ × 3½ × 8/20	9½ × 9/2
48	12 × 10/20	3½ × 3½ × 8/20	10½ × 10/20	3½ × 3½ × 8/20	10½ × 10/20	3½ × 3½ × 8/20	10 × 10/20	3½ × 3½ × 8/20	10 × 9/2
50	12 × 11/20	3½ × 3½ × 9/20	11 × 10/20	3½ × 3½ × 8/20	11 × 10/20	3½ × 3½ × 8/20	10½ × 10/20	3½ × 3½ × 8/20	10½ × 9/2
52	12 × 12/20	3½ × 3½ × 9/20	11 × 11/20	3½ × 3½ × 8/20	11 × 11/20	3½ × 3½ × 8/20	11 × 10/20	3½ × 3½ × 8/20	10½ × 1/2

The size of all beams (with the exception of those of spar decks, awning decks, poops and forecastles), which are not less in length than three-fourths of the length of the midship beam, to be of the size given above for beams amidships; those of less length may be of the size given above, excepting those at hatchways exceeding in length four spaces of frames, mast and windlass beams, and beams under deck houses and the heel of bowsprit, which must not be less in size than the midship beam.

Strong beams in the machinery space must in all cases have double angle bars on their upper and lower edges.

No reduction is admitted at the ends of vessels in the size of spar and awning deck beams, and beams of poops and forecastles from those given above.

Where a poop, bridge, or forecastle is fitted on a spar deck, the beams may be one grade smaller than given above for poop, bridge, and forecastle beams.

The beams to fore and after peak tanks to be fitted to every frame, and to be of the size required for main deck beams at the ends of the vessel.

Butterley beams, when substituted for bulb plate and double angles, may, except in the case of wide spaced strong hold beams be of the depth and thickness given for bulb beams in Table.

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BEAMS. TABLE S 4.

Spar-deck all fore and Fore-Beams.	Size of Awning Deck Beams, Poop Beams, and Bridge Beams (*a*).		Hold Beams (*b*) of Extra Strength.		Beams on every frame where Steel or Iron Decks are fitted (*c*). One, two & "Three deck" Vessels.	Spar deck.	Poop, Awning deck, Bridge, and Forecastle (*d*)
Double Angle Bars. ins. ins. ins.	Bulb Plate. ins. ins.	Single Angle Bars. ins. ins. ins.	Plate or Bulb Plate. ins. ins.	Size of Angle Bars. ins. ins. ins.	Single Angle Bars. ins. ins. ins.	Single Angle Bars. ins. ins. ins.	Single Angle Bars. ins. ins. ins.
$4\frac{1}{2}\times3\times\frac{7}{20}$ Single Angle.							
$5\times3\times\frac{7}{20}$ Single Angle.		$4\frac{1}{2}\times3\times\frac{6}{20}$			$4\times2\frac{1}{2}\times\frac{6}{20}$		
$5\frac{1}{2}\times3\times\frac{7}{20}$ Single Angle.		$5\times3\times\frac{6}{20}$	$7\times\frac{7}{20}$	$3\times3\times\frac{6}{20}$	$5\times3\times\frac{6}{20}$	$4\times2\frac{1}{2}\times\frac{6}{20}$	
$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{20}$		$5\times3\times\frac{7}{20}$	$7\frac{1}{2}\times\frac{7}{20}$	$3\times3\times\frac{7}{20}$	$5\times3\times\frac{7}{20}$	$5\times3\times\frac{6}{20}$	
$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{20}$		$5\frac{1}{2}\times3\times\frac{7}{20}$	$8\times\frac{8}{20}$	$4\times3\times\frac{7}{20}$	$5\frac{1}{2}\times3\times\frac{7}{20}$	$5\times3\times\frac{7}{20}$	$4\times2\frac{1}{2}\times\frac{6}{20}$
$3\times2\frac{1}{2}\times\frac{5}{20}$		$6\times3\times\frac{7}{20}$	$8\frac{1}{2}\times\frac{8}{20}$	$4\times3\times\frac{7}{20}$	$5\frac{1}{2}\times3\times\frac{8}{20}$	$5\frac{1}{2}\times3\times\frac{7}{20}$	$4\frac{1}{2}\times3\times\frac{6}{20}$
$3\times3\times\frac{5}{20}$		$6\frac{1}{2}\times3\times\frac{8}{20}$	$9\times\frac{9}{20}$	$4\times3\frac{1}{2}\times\frac{8}{20}$	$5\frac{1}{2}\times3\times\frac{8}{20}$ Bulb Angle.	$5\frac{1}{2}\times3\times\frac{8}{20}$	$5\times3\times\frac{6}{20}$
$3\times3\times\frac{6}{20}$	$6\times\frac{6}{20}$ Bulb Angle.	Double Angle Bars. $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{20}$ $6\frac{1}{2}\times3\times\frac{8}{20}$	$9\frac{1}{2}\times\frac{9}{20}$	$4\times4\times\frac{8}{20}$	$6\times3\times\frac{8}{20}$ Bulb Angle.	$5\frac{1}{2}\times3\times\frac{8}{20}$ Bulb Angle.	$5\times3\times\frac{7}{20}$
$3\times3\times\frac{6}{20}$	$6\frac{1}{2}\times\frac{6}{20}$ Bulb Angle.	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{20}$ $7\times3\times\frac{8}{20}$	$10\times\frac{10}{20}$	$4\times4\times\frac{9}{20}$	$6\frac{1}{2}\times3\times\frac{9}{20}$ Bulb Angle.	$6\times3\times\frac{8}{20}$ Bulb Angle.	$5\frac{1}{2}\times3\times\frac{7}{20}$
$3\times3\times\frac{6}{20}$	$7\times\frac{7}{20}$	$3\times2\frac{1}{2}\times\frac{6}{20}$	$10\frac{1}{2}\times\frac{10}{20}$	$4\frac{1}{2}\times4\times\frac{9}{20}$	$7\frac{1}{2}\times3\times\frac{9}{20}$ Bulb Angle.	$6\frac{1}{2}\times3\times\frac{8}{20}$ Bulb Angle.	$6\times3\times\frac{8}{20}$
$3\times3\times\frac{6}{20}$	$7\frac{1}{2}\times\frac{7}{20}$	$3\times3\times\frac{6}{20}$	$11\times\frac{11}{20}$	$5\times4\times\frac{9}{20}$	$7\frac{1}{2}\times3\times\frac{10}{20}$ Bulb Angle.	$7\times3\times\frac{9}{20}$ Bulb Angle.	$6\times3\times\frac{8}{20}$ Bulb Angle.
$3\frac{1}{2}\times3\times\frac{7}{20}$	$8\times\frac{8}{20}$	$3\times3\times\frac{6}{20}$	$11\frac{1}{2}\times\frac{11}{20}$	$5\times4\times\frac{9}{20}$	$8\times3\times\frac{11}{20}$ Bulb Angle.	$7\frac{1}{2}\times3\times\frac{10}{20}$ Bulb Angle.	$6\frac{1}{2}\times3\times\frac{8}{20}$ Bulb Angle.
$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{20}$	$8\frac{1}{2}\times\frac{8}{20}$	$3\times3\times\frac{7}{20}$	$12\times\frac{12}{20}$	$5\frac{1}{2}\times4\times\frac{9}{20}$	$8\frac{1}{2}\times3\times\frac{11}{20}$ Bulb Angle.	$8\times3\times\frac{10}{20}$ Bulb Angle.	$7\times3\times\frac{8}{20}$ Bulb Angle.
$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{20}$	$9\times\frac{9}{20}$	$3\frac{1}{2}\times3\times\frac{7}{20}$	$12\times\frac{12}{20}$	$6\times4\times\frac{9}{20}$	$8\frac{1}{2}\times3\times\frac{12}{20}$ Bulb Angle.	$8\times3\times\frac{11}{20}$ Bulb Angle.	$7\times3\times\frac{9}{20}$ Bulb Angle.
$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{20}$	$9\frac{1}{2}\times\frac{9}{20}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{20}$	$13\times\frac{13}{20}$	$6\times4\times\frac{10}{20}$	$9\times3\times\frac{12}{20}$ Bulb Angle.	$8\frac{1}{2}\times3\times\frac{11}{20}$ Bulb Angle.	$7\frac{1}{2}\times3\times\frac{9}{20}$ Bulb Angle.
$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{20}$	$10\times\frac{9}{20}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{20}$	$13\times\frac{13}{20}$	$6\times4\times\frac{10}{20}$	$9\times3\times\frac{13}{20}$ Bulb Angle.	$8\frac{1}{2}\times3\times\frac{12}{20}$ Bulb Angle.	$8\times3\times\frac{9}{20}$ Bulb Angle.
$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{20}$	$10\times\frac{10}{20}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{20}$	$13\times\frac{13}{20}$	$6\times4\times\frac{11}{20}$	$9\frac{1}{2}\times3\times\frac{13}{20}$ Bulb Angle.	$9\times3\times\frac{12}{20}$ Bulb Angle.	$8\times3\times\frac{10}{20}$ Bulb Angle.

(a) The beams at the ends of hatchways from six to ten spaces of frames in length, must be equal in size to those of the main deck ; and in awning decks and long bridges to be of the size of spar deck beams.

(b) These beams are to be formed of either a plate with double angle bars on its upper and lower edges, or a bulb plate with double angle bars and a covering plate on its upper edge. The beam plates and angle bars are to be of the sizes given above, and the broad flanges of the angle bars are to be fitted horizontally ; the covering plate is to be of the thickness given for the angle bars.

Strong beams at the spar deck in machinery space may be of the size of main deck beams of the same length, with double angle bars on their upper and lower edges of the size given for the corresponding beam, in "hold beams of extra strength."

Semi-box beams may be adopted in lieu thereof, formed of bulb plate and single angle bars of the sizes given for ordinary beams, secured in the usual way to two consecutive frames, and plated over by plating six-twentieths of an inch in thickness.

(c) Beams to every frame, when eight-twentieths of an inch thick or above, may be reduced one-twentieth of an inch in thickness, where less than three-fourths of the length of the amidship beam.

(d) Bulb beams of the size required for spar deck beams to be fitted in way of windlass or capstan.

The form of the bulbs to be in accordance with the sketches preceding these Tables.

STEEL VESSELS.

Table of Minimum Dimensions of STRINGER

PLATING NUMBERS OF VESSELS. *(See Section 2.)*		2000 to 3000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
Under 10 Depths, or Under 8 Breadths in Length.	Dimensions of Main Stringer Plates, &c.	20 × $\frac{5}{20}$	20 × $\frac{6}{20}$	23 × $\frac{6}{20}$	26 × $\frac{6}{20}$	28 × $\frac{6}{20}$	28 × $\frac{7}{20}$	30 × $\frac{7}{20}$	32 × $\frac{7}{20}$	32 × $\frac{8}{20}$	34 × $\frac{8}{20}$	36 × $\frac{8}{20}$
10 to 11 Depths, or 8 to 8½ Breadths.		22 × $\frac{5}{20}$	22 × $\frac{6}{20}$	25 × $\frac{6}{20}$	28 × $\frac{6}{20}$	31 × $\frac{6}{20}$	32 × $\frac{7}{20}$	34 × $\frac{7}{20}$	36 × $\frac{7}{20}$	36 × $\frac{8}{20}$	38 × $\frac{8}{20}$	40 × $\frac{8}{2\ldots}$
11 to 12 Depths, or 8½ to 9 Breadths.		24 × $\frac{5}{20}$	25 × $\frac{6}{20}$	28 × $\frac{6}{20}$	31 × $\frac{6}{20}$	34 × $\frac{6}{20}$	36 × $\frac{7}{20}$	38 × $\frac{7}{20}$	40 × $\frac{7}{20}$	40 × $\frac{8}{20}$	42 × $\frac{8}{20}$	44 × $\frac{8}{2\ldots}$
12 to 13 Depths, or 9 to 9½ Breadths.		24 × $\frac{6}{20}$	25 × $\frac{7}{20}$	28 × $\frac{7}{20}$	31 × $\frac{7}{20}$	34 × $\frac{7}{20}$	36 × $\frac{8}{20}$	38 × $\frac{8}{20}$	40 × $\frac{8}{20}$	40 × $\frac{9}{20}$	42 × $\frac{9}{20}$	44 × $\frac{9}{2\ldots}$
13 to 14 Depths, or 9½ to 10 Breadths.		27 × $\frac{6}{20}$	28 × $\frac{7}{20}$	31 × $\frac{7}{20}$	34 × $\frac{7}{20}$	37 × $\frac{7}{20}$	40 × $\frac{8}{20}$	42 × $\frac{8}{20}$	44 × $\frac{8}{20}$	44 × $\frac{9}{20}$	44 × $\frac{9}{20}$ Steel Deck	46 × $\frac{9}{2\ldots}$ $\frac{6}{20}$ for H…
14 to 15 Depths, or 10 to 10½ Breadths.		30 × $\frac{6}{20}$	31 × $\frac{7}{20}$	31 × $\frac{8}{20}$	34 × $\frac{8}{20}$	37 × $\frac{8}{20}$	40 × $\frac{9}{20}$	42 × $\frac{9}{20}$	44 × $\frac{9}{20}$	44 × $\frac{10}{20}$	46 × $\frac{10}{20}$	48 × $\frac{1\ldots}{2\ldots}$ Complet…
15 to 16 Depths, or over 10½ Breadths.		33 × $\frac{6}{20}$	34 × $\frac{7}{20}$	34 × $\frac{8}{20}$	38 × $\frac{8}{20}$	40 × $\frac{8}{20}$	44 × $\frac{9}{20}$	46 × $\frac{9}{20}$	48 × $\frac{9}{20}$	48 × $\frac{10}{20}$	50 × $\frac{10}{20}$	52 × $\frac{1\ldots}{2\ldots}$
Ends of Stringer Plates.				15 × $\frac{5}{20}$	17 × $\frac{5}{20}$	19 × $\frac{5}{20}$	19 × $\frac{6}{20}$	20 × $\frac{6}{20}$	22 × $\frac{6}{20}$	22 × $\frac{7}{20}$	23 × $\frac{7}{20}$	24 × $\frac{7}{2\ldots}$
Hold and Lower Deck Beam Stringer Plates (extreme breadth).							20 × $\frac{6}{20}$	21 × $\frac{6}{20}$	22 × $\frac{6}{20}$	23 × $\frac{7}{20}$	25 × $\frac{7}{20}$	27 × $\frac{7}{2\ldots}$
Ends of Ditto.							16 × $\frac{5}{20}$	16 × $\frac{5}{20}$	17 × $\frac{5}{20}$	18 × $\frac{6}{20}$	19 × $\frac{6}{20}$	21 × …
Tie Plate on Beams, Fore-and-aft, and Diagonals.				7 × $\frac{6}{20}$	7 × $\frac{6}{20}$	7 × $\frac{6}{20}$	8 × $\frac{7}{20}$	8 × $\frac{7}{20}$	9 × $\frac{7}{20}$	9 × $\frac{8}{20}$	10 × $\frac{8}{20}$	10 × …
Ends of Ditto.				7 × $\frac{5}{20}$	7 × $\frac{5}{20}$	7 × $\frac{5}{20}$	8 × $\frac{6}{20}$	8 × $\frac{6}{20}$	9 × $\frac{6}{20}$	9 × $\frac{7}{20}$	10 × $\frac{7}{20}$	10 × …

1. *The depths for proportions to be taken from upper side of keel to top of upper deck beams in one, two, and three deck ships, and to top of main deck in spar and awning deck vessels; and, in spar decked vessels, two depths may be taken off the proportions, so that in a spar-decked vessel of thirteen and under fourteen depths in length, the stringers, &c., may be of the sizes given in the above Table for vessels of eleven and under twelve depths in length; and so on.*

2. In *two decked* vessels the stringer plates indicated with regard to the vessel's proportions in the above Table are to be fitted to the upper deck beams.

3. In *three decked* vessels the stringer plates so indicated in the above Table are to be fitted to both upper and middle deck beams.

4. In *spar decked* vessels the stringer plates given in the above Table are to be fitted to the main deck beams; and the stringer plates required for the spar deck beams are to be the breadth of, and may be $\frac{1}{20}$ of an inch less in thickness than the stringer plates given on the upper line of the Table for vessels of the same plating number, and may be reduced at their ends $\frac{1}{20}$ of an inch in thickness, before and abaft the half length amidships, and to the breadth given for the ends of the main deck stringer plate in the Table.

TABLE S 5.

(For Nos. 27000 to 72000 see Continuation.)

	13000	14000	15000	16000	17000	18000	19000	20000	21000	22000	23000	24000	25000
	36 × $\frac{9}{20}$	40 × $\frac{9}{20}$	42 × $\frac{9}{20}$	42 × $\frac{10}{20}$	44 × $\frac{10}{20}$	46 × $\frac{10}{20}$	48 × $\frac{10}{20}$	50 × $\frac{10}{20}$	52 × $\frac{10}{20}$	54 × $\frac{10}{20}$	54 × $\frac{10}{20}$ Stl Dk $\frac{6}{20}$	56 × $\frac{10}{20}$ ½ Len Amid	Complete 58 × $\frac{10}{20}$ Stl Dk $\frac{6}{20}$
	40 × $\frac{9}{20}$	44 × $\frac{9}{20}$	46 × $\frac{9}{20}$	46 × $\frac{10}{20}$	48 × $\frac{10}{20}$	50 × $\frac{10}{20}$	52 × $\frac{10}{20}$	52 × $\frac{10}{20}$ Stl Dk $\frac{6}{20}$	54 × $\frac{10}{20}$ for ½ Lgth	56 × $\frac{10}{20}$ Amidships	58 × $\frac{10}{20}$ Complete	60 × $\frac{10}{20}$ Steel	62 × $\frac{10}{20}$ Deck $\frac{6}{20}$
	44 × $\frac{9}{20}$	48 × $\frac{9}{20}$	50 × $\frac{9}{20}$	46 × $\frac{10}{20}$ Steel Deck	48 × $\frac{10}{20}$ $\frac{6}{20}$ for Hlf	50 × $\frac{10}{20}$ Length	52 × $\frac{10}{20}$ Amidships	54 × $\frac{10}{20}$ Complete	56 × $\frac{10}{20}$ Steel	58 × $\frac{10}{20}$ Deck $\frac{6}{20}$	60 × $\frac{10}{20}$ Complete	62 × $\frac{10}{20}$ Steel	64 × $\frac{10}{20}$ Deck $\frac{7}{20}$
	44 × $\frac{10}{20}$ Steel Deck	46 × $\frac{10}{20}$ $\frac{6}{20}$ for Hlf	48 × $\frac{10}{20}$ Length	50 × $\frac{10}{20}$ Amidships	52 × $\frac{10}{20}$ Complete	54 × $\frac{10}{20}$ Steel	56 × $\frac{10}{20}$ Deck $\frac{6}{20}$	58 × $\frac{10}{20}$	60 × $\frac{10}{20}$	62 × $\frac{10}{20}$ Complete	64 × $\frac{10}{20}$ Steel	66 × $\frac{10}{20}$ Deck $\frac{7}{20}$	68 × $\frac{10}{20}$
	46 × $\frac{10}{20}$ Len Amids	48 × $\frac{10}{20}$ Complete	50 × $\frac{10}{20}$ Steel	52 × $\frac{10}{20}$ Deck $\frac{6}{20}$	54 × $\frac{10}{20}$	58 × $\frac{10}{20}$	60 × $\frac{10}{20}$	62 × $\frac{10}{20}$ Complete	64 × $\frac{10}{20}$ Steel	66 × $\frac{10}{20}$ Deck $\frac{7}{20}$	68 × $\frac{10}{20}$	70 × $\frac{10}{20}$	Cpl Stl Up Dk $\frac{7}{20}$ 51 × $\frac{10}{20}$ & Mdl Dk ½ L. $\frac{7}{20}$
	50 × $\frac{10}{20}$ Steel	52 × $\frac{10}{20}$ Deck $\frac{6}{20}$	54 × $\frac{10}{20}$	56 × $\frac{10}{20}$	58 × $\frac{10}{20}$ Complete	62 × $\frac{10}{20}$ Steel	64 × $\frac{10}{20}$ Deck $\frac{7}{20}$	66 × $\frac{10}{20}$	68 × $\frac{10}{20}$	Complete 46 × $\frac{10}{20}$ and Middle	Steel Uppr 48 × $\frac{10}{20}$ Dk for Half	Deck $\frac{7}{20}$ 50 × $\frac{10}{20}$ Lngth $\frac{7}{20}$	Cmpl Steel Upper and 52 × $\frac{10}{20}$ Mdl Dk $\frac{7}{20}$
	54 × $\frac{10}{20}$	56 × $\frac{10}{20}$	58 × $\frac{10}{20}$	60 × $\frac{10}{20}$	62 × $\frac{10}{20}$	64 × $\frac{10}{20}$	Complete 44 × $\frac{10}{20}$ and Middle	Steel Uppr 45 × $\frac{10}{20}$ Dk for Half	Deck $\frac{7}{20}$ 46 × $\frac{10}{20}$ Lngth $\frac{7}{20}$	Complete 47 × $\frac{10}{20}$ Middle	Steel 48 × $\frac{10}{20}$ Deck $\frac{7}{20}$	Upper and 50 × $\frac{10}{20}$ thick	Cpl Stl Up Dk $\frac{8}{20}$ 52 × $\frac{10}{20}$ and Mdl Dk $\frac{7}{20}$
	24 × $\frac{8}{20}$	26 × $\frac{8}{20}$	28 × $\frac{8}{20}$	28 × $\frac{8}{20}$	29 × $\frac{8}{20}$	30 × $\frac{8}{20}$	31 × $\frac{8}{20}$	32 × $\frac{8}{20}$	33 × $\frac{8}{20}$	35 × $\frac{8}{20}$	36 × $\frac{8}{20}$	36 × $\frac{8}{20}$	37 × $\frac{8}{20}$
	28 × $\frac{8}{20}$	29 × $\frac{8}{20}$	30 × $\frac{8}{20}$	31 × $\frac{9}{20}$	32 × $\frac{9}{20}$	33 × $\frac{9}{20}$	34 × $\frac{9}{20}$	35 × $\frac{9}{20}$	37 × $\frac{9}{20}$	38 × $\frac{9}{20}$	39 × $\frac{9}{20}$	40 × $\frac{9}{20}$	41 × $\frac{9}{20}$
	22 × $\frac{7}{20}$	23 × $\frac{7}{20}$	24 × $\frac{7}{20}$	24 × $\frac{8}{20}$	25 × $\frac{8}{20}$	26 × $\frac{8}{20}$	26 × $\frac{8}{20}$	27 × $\frac{8}{20}$	28 × $\frac{8}{20}$	29 × $\frac{8}{20}$	30 × $\frac{8}{20}$	31 × $\frac{8}{20}$	32 × $\frac{8}{20}$
	10 × $\frac{9}{20}$	11 × $\frac{9}{20}$	12 × $\frac{9}{20}$	12 × $\frac{10}{20}$	13 × $\frac{10}{20}$	13 × $\frac{10}{20}$	13 × $\frac{10}{20}$	14 × $\frac{10}{20}$	14 × $\frac{10}{20}$	15 × $\frac{10}{20}$	15 × $\frac{10}{20}$	15 × $\frac{10}{20}$	16 × $\frac{10}{20}$
	10 × $\frac{8}{20}$	11 × $\frac{8}{20}$	12 × $\frac{8}{20}$	12 × $\frac{8}{20}$	13 × $\frac{8}{20}$	13 × $\frac{8}{20}$	13 × $\frac{8}{20}$	14 × $\frac{8}{20}$	14 × $\frac{8}{20}$	15 × $\frac{8}{20}$	15 × $\frac{8}{20}$	15 × $\frac{8}{20}$	16 × $\frac{8}{20}$

5. In *awning decked* vessels the stringer plates given in the above Table are to be fitted to the main deck beams, and the stringer plates required for the awning deck beams are to be of the same width as those given in the Table for hold beam stringer plates, and to be of the following thicknesses, viz. :—

In Vessels whose plating number is under 13,000, not less than $\frac{6}{20}$ of an inch.

13,000 and under 18,000			„	„	$\frac{7}{20}$	„	„
18,000	„	24,000	„	„	$\frac{8}{20}$	„	„
24,000	„	31,000	„	„	$\frac{9}{20}$	„	„

6. *All stringer plates* are to maintain their midship breadth for one-half the vessel's length amidships; from thence the breadth may be gradually reduced to that given above for the ends of the vessel.

STEEL VESSELS.

Table of Minimum Dimensions of STRINGEF

PLATING NUMBERS OF VESSELS. *(See Section 2.)*	27000	28000	29000	31000	32000	34000	35000	36000	38000	39000
Dimensions of Main Stringer Plates, &c. — Under 10 depths, or Under 8 Breadths in Length,	$60 \times \frac{10}{20}$ Complete	$62 \times \frac{10}{20}$ Stl Dk $\frac{6}{20}$	$65 \times \frac{10}{20}$	$68 \times \frac{10}{20}$ Complete	$70 \times \frac{10}{20}$ Steel Deck	$72 \times \frac{10}{20}$ $\frac{7}{20}$	Cmpl Steel $56 \times \frac{10}{20}$ and Mid Dk	Up Dk $\frac{7}{20}$ $57 \times \frac{10}{20}$ ½ Lgth $\frac{7}{20}$	Cmpl Steel $58 \times \frac{10}{20}$ Middle	Upper $59 \times \frac{1}{2}$ Deck
10 to 11 Depths, or 8 to 8½ Breadths,	$64 \times \frac{10}{20}$	$66 \times \frac{10}{20}$ Complete	$68 \times \frac{10}{20}$ Steel	$70 \times \frac{10}{20}$ Deck $\frac{7}{20}$	$72 \times \frac{10}{20}$	Cmpl Steel $55 \times \frac{10}{20}$ & Mid Dk	Up Dk $\frac{7}{20}$ $56 \times \frac{10}{20}$ ½ Lgth $\frac{7}{20}$	Cmpl Steel $57 \times \frac{10}{20}$ Middle	Upper and $58 \times \frac{10}{20}$ Deck $\frac{7}{20}$	Cmpl Ste $59 \times \frac{1}{2}$
11 to 12 Depths, or 8½ to 9 Breadths.	$66 \times \frac{10}{20}$ Complete	$68 \times \frac{10}{20}$ Steel	$70 \times \frac{10}{20}$ Deck $\frac{7}{20}$	Cmpl Steel $54 \times \frac{10}{20}$ and Mid Dk	Up Dk $\frac{7}{20}$ $55 \times \frac{10}{20}$ ½ Lgth $\frac{7}{20}$	Cmpl Steel $56 \times \frac{10}{20}$ Middle	Upper $57 \times \frac{10}{20}$ Deck	and $58 \times \frac{10}{20}$ $\frac{7}{20}$	Cmpl Steel $59 \times \frac{10}{20}$ and	Upper $60 \times \frac{1}{2}$ Middle
12 to 13 Depths, or 9 to 9½ Breadths.	Cmpl Steel $70 \times \frac{10}{20}$ Deck $\frac{7}{20}$	Cmpl Steel $53 \times \frac{10}{20}$ and Mid Dk	Up Dk $\frac{7}{20}$ $54 \times \frac{10}{20}$ ½ Lgth $\frac{7}{20}$	Cmpl Steel $55 \times \frac{10}{20}$ Middle	Upper and $56 \times \frac{10}{20}$ Deck $\frac{7}{20}$	Cmpl Steel $57 \times \frac{10}{20}$ and	Upper $58 \times \frac{10}{20}$ Middle Dk	Deck $\frac{8}{20}$ $59 \times \frac{10}{20}$ $\frac{7}{20}$	Cmpl Steel $60 \times \frac{10}{20}$ Middle	Upper $61 \times \frac{1}{2}$ Deck
13 to 14 Depths, or 9½ to 10 Breadths.	Cmp Stl Up Dk $\frac{7}{20}$ $52 \times \frac{10}{20}$ & Mdl Dk ½ L. $\frac{7}{20}$	Cmpl Steel $53 \times \frac{10}{20}$ Middle	Upper and $54 \times \frac{10}{20}$ Deck $\frac{7}{20}$	Cmpl Steel $55 \times \frac{10}{20}$ and Middle	Up Dk $\frac{8}{20}$ $56 \times \frac{10}{20}$ Deck $\frac{7}{20}$	Cmpl Steel $57 \times \frac{10}{20}$ Middle	Upper $58 \times \frac{10}{20}$ Deck	and $59 \times \frac{10}{20}$ $\frac{8}{20}$	Cmpl Steel $60 \times \frac{10}{20}$ and	Upper $61 \times \frac{1}{2}$ Middle D
14 to 15 Depths, or 10 to 10½ Breadths.	Cmpl Steel Upper and $53 \times \frac{10}{20}$ Mdl Dk $\frac{7}{20}$	Cmpl Steel $54 \times \frac{10}{20}$ and Mid Dk	Up Dk $\frac{8}{20}$ $55 \times \frac{10}{20}$ $\frac{7}{20}$ thick	Cmpl Steel $56 \times \frac{10}{20}$ Middle	Upper and $57 \times \frac{10}{20}$ Deck $\frac{8}{20}$	Cmpl Steel $58 \times \frac{10}{20}$ and	Upper $59 \times \frac{10}{20}$ Middle Dk	Deck $\frac{9}{20}$ $60 \times \frac{10}{20}$ $\frac{8}{20}$	Cmpl Steel $61 \times \frac{10}{20}$ Middle	Upper $61 \times \frac{1}{2}$ Deck $\frac{9}{2}$
15 to 16 Depths, or over 10½ Breadths.	Cmp Stl Up Dk $\frac{8}{20}$ $53 \times \frac{10}{20}$ and Mdl Dk $\frac{7}{20}$	Cmpl Steel $54 \times \frac{10}{20}$ Middle Dk	Upper and $55 \times \frac{10}{20}$ $\frac{8}{20}$ thick							
Ends of Stringer Plates.	$38 \times \frac{8}{20}$	$40 \times \frac{8}{20}$	$41 \times \frac{8}{20}$	$42 \times \frac{8}{20}$	$43 \times \frac{8}{20}$	$44 \times \frac{8}{20}$	$45 \times \frac{9}{20}$	$45 \times \frac{9}{20}$	$46 \times \frac{9}{20}$	$47 \times \frac{9}{2}$
Hold and Lower Deck Beam Stringer Plates (extreme breadth).	$42 \times \frac{9}{20}$	$43 \times \frac{9}{20}$	$44 \times \frac{9}{20}$	$45 \times \frac{9}{20}$	$46 \times \frac{9}{20}$	$47 \times \frac{9}{20}$	$48 \times \frac{9}{20}$	$50 \times \frac{9}{20}$	$51 \times \frac{9}{20}$	$52 \times \frac{9}{2}$
Ends of ditto.	$33 \times \frac{8}{20}$	$33 \times \frac{8}{20}$	$34 \times \frac{8}{20}$	$35 \times \frac{8}{20}$	$36 \times \frac{8}{20}$	$36 \times \frac{8}{20}$	$37 \times \frac{8}{20}$	$38 \times \frac{8}{20}$	$40 \times \frac{8}{20}$	$41 \times \frac{8}{2}$
Tie Plates on Beams, Fore-and-aft, and Diagonals.	$16 \times \frac{10}{20}$	$17 \times \frac{10}{20}$	$17 \times \frac{10}{20}$	$18 \times \frac{10}{20}$	$18 \times \frac{10}{20}$	$19 \times \frac{10}{20}$	$19 \times \frac{10}{20}$	$20 \times \frac{10}{20}$	$20 \times \frac{10}{20}$	$21 \times \frac{1}{2}$
Ends of ditto.	$16 \times \frac{8}{20}$	$17 \times \frac{8}{20}$	$17 \times \frac{8}{20}$	$18 \times \frac{8}{20}$	$18 \times \frac{8}{20}$	$19 \times \frac{8}{20}$	$19 \times \frac{8}{20}$	$20 \times \frac{8}{20}$	$20 \times \frac{8}{20}$	$21 \times \frac{8}{2}$

7. Where a reduction of $\frac{2}{20}$ths of an inch from the midship thickness is allowed for the ends, the stringer plates may be reduced $\frac{1}{20}$th of an inch in thickness for one-eighth of the vessel's length before and abaft the half length amidships, and from thence to the ends they may be reduced to the thickness required at ends.

8. Where there is a *steel deck* prescribed either for the entire length of the vessel, or for half the length amidships, it is to be fitted to the upper deck beams in two-decked vessels. In three-decked vessels and spar-decked vessels it may be fitted either to the upper or middle deck beams.

9. In way of a *steel deck* or *half-steel deck*, the stringer plates may be reduced in width to one inch for every seven feet of the length of the vessel, but the thickness is to be as given above, and at the ends of the vessel the stringer plates to be in accordance with the Table for "ends of stringer plates." Where more than one steel deck is required the stringer plates are to be of the breadth and thickness given in the Table.

10. Where a *steel deck* is prescribed in the Table to be fitted for one half the vessel's length amidships, it is to be maintained the full breadth of the vessel for that length, and then tapered gradually into the stringer plates for one-eighth the vessel's length at each end.

40000	42000	44000	46000	48000	50000	52000	54000	57000	60000	64000	68000	72000
and 60 × $\frac{10}{20}$ $\frac{7}{20}$ thick	Cmpl Steel 60 × $\frac{11}{20}$ and	Upper Dck 62 × $\frac{11}{20}$ Middle Dk	$\frac{8}{20}$ thick 64 × $\frac{11}{20}$ $\frac{7}{20}$ thick	Cmpl Steel 66 × $\frac{11}{20}$ Middle	Upper 68 × $\frac{11}{20}$ Deck	and 70 × $\frac{11}{20}$ $\frac{8}{20}$	Cmpl Steel 72 × $\frac{11}{20}$ and	Upper 74 × $\frac{11}{20}$ Middle Dk	Deck $\frac{9}{20}$ 76 × $\frac{11}{20}$ $\frac{8}{20}$	Cmpl Steel 78 × $\frac{11}{20}$ Middle	Upper 80 × $\frac{11}{20}$ Deck	and 82 × $\frac{11}{20}$ $\frac{9}{20}$
Upper Dk 60 × $\frac{10}{20}$ Deck	$\frac{8}{20}$ and 60 × $\frac{11}{20}$ $\frac{7}{20}$ thick	Middle 62 × $\frac{11}{20}$	Cmpl Steel 64 × $\frac{11}{20}$ Middle	Upper 66 × $\frac{11}{20}$ Deck	and 68 × $\frac{11}{20}$ $\frac{8}{20}$	Cmpl Steel 70 × $\frac{11}{20}$ and	Upper Dk 72 × $\frac{11}{20}$ Middle Dk	$\frac{9}{20}$ 74 × $\frac{11}{20}$ $\frac{8}{20}$	Cmpl Steel 76 × $\frac{11}{20}$ Middle	Upper 78 × $\frac{11}{20}$ Deck	and 80 × $\frac{11}{20}$ $\frac{9}{20}$	3 Dks $\frac{10}{20}$ 82 × $\frac{11}{20}$ $\frac{9}{20}$ & $\frac{7}{20}$
Deck $\frac{8}{20}$ 60 × $\frac{11}{20}$ Deck $\frac{7}{20}$	Cmpl Steel 62 × $\frac{11}{20}$ Middle	Upper 64 × $\frac{11}{20}$ Deck $\frac{8}{20}$	and 66 × $\frac{11}{20}$ thick	Cmpl Steel 68 × $\frac{11}{20}$ and	Upper Dk 70 × $\frac{11}{20}$ Middle Dk	$\frac{9}{20}$ 72 × $\frac{11}{20}$ $\frac{8}{20}$	74 × $\frac{11}{20}$	Cmpl Steel 76 × $\frac{11}{20}$ Middle Dk	Upper and 78 × $\frac{11}{20}$ $\frac{9}{20}$	80 × $\frac{11}{20}$	Cmpl Steel 80 × $\frac{11}{20}$ Md Dk $\frac{9}{20}$	UpDk $\frac{10}{20}$ 82 × $\frac{11}{20}$ Lr Dk $\frac{7}{20}$
and 61 × $\frac{11}{20}$ $\frac{8}{20}$ thick	Cmpl Steel 63 × $\frac{11}{20}$ andMiddle	Upper 65 × $\frac{11}{20}$ Deck $\frac{8}{20}$	Deck $\frac{9}{20}$ 67 × $\frac{11}{20}$ thick	69 × $\frac{11}{20}$	71 × $\frac{11}{20}$ Cmpl Steel	73 × $\frac{11}{20}$ Upper and	75 × $\frac{11}{20}$ Middle Dk	77 × $\frac{11}{20}$ $\frac{9}{20}$	Cmpl Steel 78 × $\frac{11}{20}$ and	Upper Dk 80 × $\frac{11}{20}$ Lower	$\frac{10}{20}$ Middle 82 × $\frac{11}{20}$ Deck $\frac{7}{20}$	Deck $\frac{9}{20}$ 82 × $\frac{11}{20}$ thick
Deck $\frac{9}{20}$ 61 × $\frac{11}{20}$ $\frac{8}{20}$ thick	Cmpl Steel 63 × $\frac{11}{20}$ Middle	Upper 65 × $\frac{11}{20}$ Deck $\frac{9}{20}$	and 67 × $\frac{11}{20}$ thick	69 × $\frac{11}{20}$	Cmpl Steel 71 × $\frac{11}{20}$ and	Upper Dk 73 × $\frac{11}{20}$ Lower	$\frac{10}{20}$ Middle 75 × $\frac{11}{20}$ Deck $\frac{7}{20}$	Deck $\frac{9}{20}$ 77 × $\frac{11}{20}$ thick	79 × $\frac{11}{20}$			
and 62 × $\frac{11}{20}$ hick	Cmpl Steel 64 × $\frac{11}{20}$ and Lower	UpDk $\frac{10}{20}$ 66 × $\frac{11}{20}$ Deck	Md Dk $\frac{9}{20}$ 68 × $\frac{11}{20}$ $\frac{7}{20}$ thick									
48 × $\frac{9}{20}$	49 × $\frac{9}{20}$	50 × $\frac{9}{20}$	51 × $\frac{9}{20}$	52 × $\frac{9}{20}$	53 × $\frac{9}{20}$	54 × $\frac{9}{20}$	55 × $\frac{9}{20}$	56 × $\frac{9}{20}$	57 × $\frac{9}{20}$	58 × $\frac{9}{20}$	60 × $\frac{9}{20}$	62 × $\frac{9}{20}$
53 × $\frac{10}{20}$	54 × $\frac{10}{20}$	55 × $\frac{10}{20}$	56 × $\frac{10}{20}$	57 × $\frac{10}{20}$	58 × $\frac{10}{20}$	59 × $\frac{10}{20}$	60 × $\frac{10}{20}$	61 × $\frac{10}{20}$	62 × $\frac{10}{20}$	63 × $\frac{10}{20}$	64 × $\frac{10}{20}$	65 × $\frac{10}{20}$
41 × $\frac{8}{20}$	42 × $\frac{8}{20}$	43 × $\frac{8}{20}$	44 × $\frac{8}{20}$	45 × $\frac{8}{20}$	46 × $\frac{8}{20}$	47 × $\frac{8}{20}$	48 × $\frac{8}{20}$	49 × $\frac{8}{20}$	50 × $\frac{8}{20}$	51 × $\frac{8}{20}$	52 × $\frac{8}{20}$	53 × $\frac{8}{20}$
21 × $\frac{10}{20}$	22 × $\frac{10}{20}$	23 × $\frac{10}{20}$	24 × $\frac{10}{20}$	25 × $\frac{10}{20}$	26 × $\frac{10}{20}$	27 × $\frac{10}{20}$	28 × $\frac{10}{20}$	29 × $\frac{10}{20}$	30 × $\frac{10}{20}$	31 × $\frac{10}{20}$	32 × $\frac{10}{20}$	33 × $\frac{10}{20}$
21 × $\frac{8}{20}$	22 × $\frac{8}{20}$	23 × $\frac{8}{20}$	24 × $\frac{8}{20}$	25 × $\frac{8}{20}$	26 × $\frac{8}{20}$	27 × $\frac{8}{20}$	28 × $\frac{8}{20}$	29 × $\frac{8}{20}$	30 × $\frac{8}{20}$	31 × $\frac{8}{20}$	32 × $\frac{8}{20}$	33 × $\frac{8}{20}$

11. *Orlop stringer plates* where required to be fitted, to be of the same thickness as the hold beam stringer plates, and three-fourths the breadth of the same.

12. Diagonal tie plates are to be fitted on the beams of all sailing vessels in way of the masts at the deck on which they are wedged, and in addition, where the plating number is 15,000 and above, diagonal tie plates are to be fitted all fore and aft on the upper deck.

13. In sailing vessels whose plating number is under 15,000, and in steam vessels not requiring a steel deck, if *diagonal tie plates* be fitted on the beams in sufficient number, and to the satisfaction of the Surveyor, their breadth as given in the Table may be deducted from the breadth given above for the stringer plates amidships, in which case the stringer plates may be reduced in breadth at the ends of the vessel to three-fourths of their breadth amidships.

14. Tie plates on all tiers of beams to be of the same thickness as the stringer plates of their respective decks.

LLOYD'S REGISTER OF SHIPPING, 2, WHITE LION COURT, CORNHILL, LONDON, E.C.

29th November, 1888.

STEEL VESSELS.

Additions beyond the requirements contained in the
to depth than in Vessels for which

Proportion of Depths to Length.	ITEMS.	PLATING UNDER 10450
Above 11 and not exceeding 12	1 Sheerstrake	1 Add $\frac{1}{20}$ for $\frac{1}{2}$ length amidships .. ..
	2 Strake below Sheerstrake	2 .. ..
	3 Upper deck Stringer plate	3 .. ..
	4 Middle line Keelson...	4 .. ..
	5 Side Keelson	5 .. ..
	6 Bilge Keelson	6 Add Bulb for $\frac{1}{2}$ length amidships.. .. ..
	7 Bilge Stringer...	7 .. ..
	8 Bilge Plating	8 One Strake increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships .. ..
Above 12 and not exceeding 13	1 Sheerstrake	1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships .. ..
	2 Strake below Sheerstrake	2 .. ..
	3 Upper deck Stringer plate	3 .. ..
	4 Middle line Keelson...	4 .. ..
	5 Side Keelson	5 .. ..
	6 Bilge Keelson	6 Add Bulb for $\frac{3}{5}$ length amidships .. ..
	7 Bilge Stringer...	7 .. ..
	8 Bilge Plating	8 Two Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships .. ..
Above 13 and not exceeding 14	1 Sheerstrake	1 Add Doubling 18 inches wide for $\frac{3}{5}$ length amidships.. ..
	2 Strake below Sheerstrake	2 .. ..
	3 Upper deck Stringer Plate	3 .. ..
	4 Middle line Keelson	4 .. ..
	5 Side Keelson	5 Double Angle Keelson to be fitted in all cases .. .. ..
	6 Bilge Keelson	6 Add Bulb for $\frac{3}{5}$ length amidships .. ..
	7 Bilge Stringer...	7 Add Bulb for $\frac{1}{2}$ length amidships .. ..
	8 Bilge Plating	8 Two Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships .. ..
Above 14 and not exceeding 15	1 Sheerstrake	1 Add Doubling 20 inches wide for $\frac{3}{4}$ length amidships ..
	2 Strake below Sheerstrake...	2 .. ..
	3 Upper deck Stringer plate	3 .. ..
	4 Middle line Keelson...	4 .. ..
	5 Side Keelson	5 Double Angle Keelson and Bulb all fore and aft .. ..
	6 Bilge Keelson	6 Add Bulb for $\frac{3}{5}$ length amidships .. ..
	7 Bilge Stringer...	7 Add Bulb for $\frac{1}{2}$ length & Intercostal for $\frac{1}{2}$ length amidships, or
	8 Bilge Plating	8 One Strake doubled for $\frac{1}{2}$ length amidships in lieu of Intercostal
Above 15 and not exceeding 16	1 Sheerstrake	1 .. ..
	2 Strake below Sheerstrake...	2 .. ..
	3 Second Strake below Sheerstrake	3 .. ..
	4 Upper deck Stringer plate	4 .. ..
	5 Middle line Keelson	5 .. ..
	6 Side Keelson	6 .. ..
	7 Bilge Keelson	7 .. ..
	8 Bilge Stringer...	8 .. ..
	9 Bilge Plating	9 .. ..

For all Vessels exceeding in length sixteen depths to the Middle Deck, plans must be submitted for the approval of the Committee for giving the Vessels sufficient additional strength longitudinally ; and all Vessels having a length of thirteen depths and above to the Upper Deck, are to have a substantial erection extending over the midship half length of the Vessel. *See also Section* 46.

Where Bulb plates are required they are to be of the size given in Table S 4, for the midship hold beams, or for main deck beams, in vessels with one deck.

Rules ; for Vessels of greater proportionate length the ordinary Scantlings are provided.

TABLE S 6.

(For Nos. 18700 to 40000 see continuation.)

NUMBERS.

10450 and under 15500	15500 and under 18700
1 Add $\frac{1}{20}$ for $\frac{3}{5}$ length amidships	1 Add $\frac{1}{20}$ for $\frac{3}{4}$ length amidships
2	2
3	3
4	4
5	5
6 Add Bulb for $\frac{1}{2}$ length amidships	6 Add Bulb for $\frac{1}{2}$ length amidships
7	7
8 One Strake increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships	8 One Strake increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships
1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships	1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships
2 Add $\frac{1}{20}$ for $\frac{1}{2}$ length amidships	2 Add $\frac{1}{20}$ for $\frac{1}{2}$ length amidships
3	3
4	4
5	5
6 Add Bulb for $\frac{3}{5}$ length amidships	6 Add Bulb for $\frac{3}{5}$ length amidships
7	7
8 Two Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships	8 Two Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships
1 Add Doubling 20 inches wide for $\frac{3}{5}$ length amidships	1 Add Doubling whole width below Stringer for $\frac{3}{5}$ length amids.
2	2
3	3
4	4
5 Add Intercostal	5
6 Add Bulb for $\frac{3}{5}$ length amidships	6 Add Bulb for $\frac{3}{5}$ length amidships
7 Add Bulb for $\frac{1}{2}$ length where no hold beams	7 Add Intercostal for $\frac{1}{2}$ length amidships, or
8 Two Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships	8 Three Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ length amidships
1 Add Doubling whole width below Stringer for $\frac{3}{4}$ length amids.	1 Add Doubling whole width below Stringer for $\frac{3}{4}$ length amids.
2	2
3	3 Add $\frac{1}{20}$ for $\frac{1}{2}$ length amidships
4	4
5 Add Intercostal	5
6 Add Bulb for $\frac{3}{5}$ length amidships	6 Add Bulb for $\frac{3}{5}$ length amidships
7 Add Intercostal for $\frac{1}{2}$ length amidships, or	7 Add Intercostal for $\frac{1}{2}$ length amidships, or
8 One Strake doubled for $\frac{1}{2}$ length amidships	8 One Strake doubled for $\frac{1}{2}$ length amidships
1 Add Doubling whole width below Stringer for $\frac{3}{4}$ length amids.	1 Add Doubling whole width for $\frac{3}{4}$ length amidships
2 Add $\frac{1}{20}$ for $\frac{1}{2}$ length amidships	2 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships
3	3
4	4
5	5
6 Add Intercostal	6
7 Add Bulb for $\frac{3}{5}$ length amidships	7 Add Intercostal for $\frac{3}{5}$ length amidships
8 Add Intercostal for $\frac{1}{2}$ length amidships, or	8 Add Intercostal for $\frac{1}{2}$ length amidships, or
9 One Strake doubled for $\frac{1}{2}$ length amidships	9 One Strake doubled for $\frac{1}{2}$ length amidships

All vessels, excepting those with an awning deck, whose plating No. exceeds 35,000 and exceeding 16 depths in length taken from the main deck, are to have the whole of the reverse frames extended to the gunwale for half the vessel's length amidships, or a sufficient number of partial bulkheads fitted in the 'tween decks to the approval of the Committee. In the case of awning-decked vessels they are all to extend to the main deck.

STEEL VESSELS.

Additions beyond the requirements contained in th
to depth than in Vessels for whic

Proportion of Depths to Length.	ITEMS.	PLATING	
		18700 and under 26000	26000 and under 35000
Above 11 and not exceeding 12	1 Sheerstrake	1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships	1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships ..
	2 Strake below Sheerstrake ...	2	2 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships ..
	3 Upper deck Stringer plate ...	3	3 .. ..
	4 Middle line Keelson	4	4 .. ..
	5 Side Keelson	5	5 Add Bulb for $\frac{1}{2}$ length amidships ..
	6 Bilge Keelson	6 Add Bulb for $\frac{3}{5}$ length amidships	6 Add Bulb for $\frac{3}{5}$ lgth. & Intcl. for $\frac{1}{2}$ lgth. amids
	7 Bilge Stringer	7	7 Add Intercostal for $\frac{1}{2}$ length amidships
	8 Bilge Plating	8 Two Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ lgth. amids.	8 .. ..
Above 12 and not exceeding 13	1 Sheerstrake	1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships	1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships ..
	2 Strake below Sheerstrake ...	2 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships	2 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships ..
	3 Upper deck Stringer plate ...	3	3 Add $\frac{2}{20}$ for $\frac{3}{5}$ length amidships ..
	4 Middle line Keelson	4	4 .. ..
	5 Side Keelson	5	5 Add Bulb for $\frac{1}{2}$ length amidships ..
	6 Bilge Keelson	6 Add Bulb for $\frac{3}{5}$ length amidships	6 Add Bulb for $\frac{3}{5}$ lgth. & Intcl. for $\frac{1}{2}$ lgth. amid
	7 Bilge Stringer	7 Add Intercostal for $\frac{1}{2}$ length amidships, or ..	7 Add Intercostal for $\frac{1}{2}$ length amidships
	8 Bilge Plating	8 Three Strakes increased $\frac{1}{20}$ for $\frac{1}{2}$ lgth. amids.	8 .. ..
Above 13 and not exceeding 14	1 Sheerstrake	1 Add Dblng. whole width below Stringer for	1 Add Doubling whole width for $\frac{3}{4}$ lgth. amid
	2 Strake below Sheerstrake ...	2 .. .. [$\frac{3}{5}$ lgth. amids.	2 .. ..
	3 Upper deck Stringer plate ...	3 Add $\frac{1}{20}$ for $\frac{1}{2}$ length amidships	3 Add $\frac{2}{20}$ for $\frac{3}{5}$ length amidships ..
	4 Middle line Keelson	4	4 To be $\frac{1}{4}$ deeper than in Table S 3. ..
	5 Side Keelson	5	5 Add Bulb for $\frac{1}{2}$ length amidships ..
	6 Bilge Keelson	6 Add Bulb for $\frac{3}{5}$ length amidships	6 Add Bulb for $\frac{3}{5}$ lgth. & Intcl. for $\frac{1}{2}$ lgth. amid
	7 Bilge Stringer	7 Add Intercostal for $\frac{1}{2}$ length amidships ..	7 Add Intercostal for $\frac{3}{5}$ length amidships
	8 Bilge Plating	8	8 .. ..
Above 14 and not exceeding 15	1 Sheerstrake	1 Add Doubling whole width for $\frac{3}{4}$ lgth. amids.	1 Add Doubling whole width for $\frac{3}{4}$ lgth. amid
	2 Strake below Sheerstrake ...	2	2 Add Doubling whole width for $\frac{1}{2}$ lgth. amid
	3 Upper deck Stringer plate ...	3 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships	3 Add $\frac{2}{20}$ for $\frac{3}{5}$ length amidships ..
	4 Middle line Keelson	4 To be $\frac{1}{4}$ deeper than in Table S 3.	4 To be $\frac{1}{4}$ deeper than in Table S 3.
	5 Side Keelson	5 Add Bulb for $\frac{1}{2}$ length amidships	5 Add plate Keelson (*a*) for $\frac{1}{2}$ length amid
	6 Bilge Keelson	6 Add Bulb for $\frac{2}{3}$ length amidships	6 Add Bulb for $\frac{2}{3}$ lgth. & Intcl. for $\frac{3}{5}$ lgth. amid
	7 Bilge Stringer	7 Add Intercostal for $\frac{1}{2}$ length amidships ..	7 Add Intercostal for $\frac{3}{5}$ length amidships
	8 Bilge Plating	8	8 .. ..
Above 15 and not exceeding 16	1 Sheerstrake	1 Add Doubling whole width for $\frac{3}{4}$ lgth. amids.	1 Add Doubling whole width for $\frac{3}{4}$ lgth. amid
	2 Strake below Sheerstrake ...	2 Add Doubling whole width for $\frac{1}{2}$ lgth. amids.	2 Add Doubling whole width for $\frac{3}{5}$ lgth. amid
	3 Second Strake below Shrstrake	3	3 .. ..
	4 Upper deck Stringer Plate ...	4 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships	4 Add Doubling 40 ins. wide for $\frac{1}{2}$ lgth. amid
	5 Middle line Keelson	5 To be $\frac{1}{4}$ deeper than in Table S 3.	5 To be $\frac{1}{4}$ deeper than in Table S 3. ..
	6 Side Keelson	6 Add Bulb for $\frac{1}{2}$ length amidships	6 Add plate Keelson (*b*) for $\frac{1}{2}$ length amid
	7 Bilge Keelson	7 Add Bulb for $\frac{3}{5}$ lgth. & Intcl. for $\frac{1}{2}$ lgth. amids.	7 Add Bulb for $\frac{2}{3}$ lgth. & Intcl. for $\frac{3}{5}$ lgth. amid
	8 Bilge Stringer	8 Add Intercostal for $\frac{3}{5}$ length amidships ..	8 Add Intercostal for $\frac{3}{5}$ length amidships
	9 Bilge Plating	9	9 .. ..

(*a*) Continuous plate Keelson standing on the floors and attached to Intercostal Keelson plates, having double angles on upper and lower edges of the sizes given in Table S 3, the plate to be of sufficient depth to take the deep flanges of the angles, and to be of the thickness given in Table S 3 for middle line Keelsons.

(*b*) Continuous plate Keelson standing on the floors and attached to Intercostal Keelson plates, having double angles on upper and lower edges of the sizes given in Table S 3, the plate to be three-fourths the depth given in Table S 3 for middle line Keelsons, and of the same thickness.

TABLE S 6.
(continued.)

NUMBERS.

35000 and under 40000	40000 and under 50000
1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships .. 2 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships .. 3 .. 4 .. 5 Add plate Keelson (***a***) for $\frac{1}{2}$ length amidships .. 6 Add Bulb for $\frac{3}{5}$ length and Intercostal for $\frac{1}{2}$ length amidships 7 Add Intercostal for $\frac{3}{5}$ length amidships .. 8 ..	1 Add $\frac{2}{20}$ for $\frac{3}{4}$ length amidships. 2 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships. 3 Add $\frac{2}{20}$ for $\frac{3}{5}$ length amidships. 4 5 Add plate Keelson (***a***) for $\frac{1}{2}$ length amidships. 6 Add Bulb for $\frac{3}{5}$ length and Intercostal for $\frac{1}{2}$ length amidships. 7 Add Intercostal for $\frac{3}{5}$ length amidships. 8
1 Add Doubling whole width for $\frac{3}{4}$ length amidships .. 2 .. 3 Add $\frac{2}{20}$ for $\frac{3}{5}$ length amidships .. 4 .. 5 Add plate Keelson (***a***) for $\frac{1}{2}$ length amidships .. 6 Add Bulb for $\frac{3}{5}$ length and Intercostal for $\frac{1}{2}$ length amidships 7 Add Intercostal for $\frac{3}{5}$ length amidships .. 8 ..	1 Add Doubling whole width for $\frac{3}{4}$ length amidships. 2 Add $\frac{2}{20}$ for $\frac{1}{2}$ length amidships. 3 Add $\frac{2}{20}$ for $\frac{3}{5}$ length amidships. 4 5 Add plate Keelson (***b***) for $\frac{1}{2}$ length amidships. 6 Add Bulb for $\frac{3}{5}$ length and Intercostal for $\frac{1}{2}$ length amidships. 7 Add Intercostal for $\frac{3}{5}$ length amidships. 8
1 Add Doubling whole width for $\frac{3}{4}$ length amidships .. 2 Add Doubling whole width for $\frac{1}{2}$ length amidships .. 3 Add $\frac{2}{20}$ for $\frac{3}{5}$ length amidships .. 4 To be $\frac{1}{4}$ deeper than in Table S 3. .. 5 Add plate Keelson (***b***) for $\frac{1}{2}$ length amidships .. 6 Add Bulb for $\frac{3}{5}$ length and Intercostal for $\frac{1}{2}$ length amidships 7 Add Intercostal for $\frac{3}{5}$ length amidships .. 8 ..	1 Add Doubling whole width for $\frac{3}{4}$ length amidships. 2 Add Doubling whole width for $\frac{1}{2}$ length amidships. 3 Add Doubling 42 inches wide for $\frac{3}{5}$ length amidships. 4 To be $\frac{1}{4}$ deeper than in Table S 3. 5 Add plate Keelson (***b***) for $\frac{1}{2}$ length amidships. 6 Add plate Keelson (***a***) for $\frac{1}{2}$ length amidships. 7 Add Intercostal for $\frac{3}{5}$ length amidships. 8
1 Add Doubling whole width for $\frac{3}{4}$ length amidships .. 2 Add Doubling whole width for $\frac{1}{2}$ length amidships .. 3 Add Doubling 42 inches wide for $\frac{3}{5}$ length amidships .. 4 To be $\frac{1}{4}$ deeper than in Table S 3. .. 5 Add plate Keelson (***b***) for $\frac{1}{2}$ length amidships .. 6 Add plate Keelson (***a***) for $\frac{1}{2}$ length amidships .. 7 Add Intercostal for $\frac{3}{5}$ length amidships .. 8 ..	1 2 3 4 To be specially considered. 5 6 7 8
1 Add Doubling whole width for $\frac{3}{4}$ length amidships .. 2 Add Doubling whole width for $\frac{3}{5}$ length amidships .. 3 Add Doubling whole width for $\frac{1}{2}$ length amidships .. 4 Add Doubling 50 inches wide for $\frac{3}{5}$ length amidships .. 5 To be $\frac{1}{4}$ deeper than in Table S 3. .. 6 Add plate Keelson (***b***) for $\frac{1}{2}$ length amidships .. 7 Add plate Keelson (***b***) for $\frac{1}{2}$ length amidships .. 8 Add Intercostal for $\frac{3}{5}$ length amidships .. 9 ..	1 2 3 4 5 To be specially considered. 6 7 8 9

In lieu of the doubling plates required above, the thickness of the Sheerstrake, the strake next below the sheerstrake, and the upper deck stringer plate may be increased in thickness to afford equivalent strength. In vessels where the plating number is over 28,000, and double butt straps are not required by Section 20, paragraph 8, such straps are to be fitted to the butts of the sheerstrake.

Lloyd's Register of Shipping, 2, White Lion Court, Cornhill, London, E.C.
18th April, 1895.

IRON VESSELS. TABLE G 7.

Table of Scantlings for DOUBLE BOTTOMS CONSTRUCTED ON THE CELLULAR SYSTEM.

PLATING NUMBER FOR REGULATING SCANTLINGS. (*See Section 2.*)	Centre Girder. — Depth above Top of Keel and Thickness.	Thickness of Side Girders	Number of SideGirders (exclusive of Margin Plates) on each side, with Floors at alternate Frames.	Margin Plate. — Depth (exclusive of Flange) and Thickness.	Thickness of Inner Bottom Plating. Middle Line Strake. (*b*) Amidships.	Thickness of Inner Bottom Plating. Middle Line Strake. (*b*) Ends.	Thickness of Inner Bottom Plating. In Engine and Boiler Space.	Thickness of Inner Bottom Plating. In Holds.	Thickness of Brack't or Floor Plates.	Dimensions of Angle Bars. On Centre Girder. (*a*)	Dimensions of Angle Bars. On Margin Plates.	Dimensions of Angle Bars. On Side Girders, Intermediate, and Vertical Angle Bars.
	inches.	inches.		inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
Under 11,000	$32 \times \frac{8}{16}$	$\frac{5}{16}$	2	$18 \times \frac{6}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3 \times 3 \times \frac{6}{16}$	$3 \times 2\frac{1}{2} \times \frac{5}{16}$
11,000 and under 13,000	$33 \times \frac{8}{16}$	$\frac{6}{16}$	2	$19 \times \frac{7}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3 \times 2\frac{1}{2} \times \frac{6}{16}$
13,000 and under 15,000	$34 \times \frac{8}{16}$	$\frac{6}{16}$	3	$20 \times \frac{7}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3 \times 3 \times \frac{6}{16}$
15,000 and under 18,000	$35 \times \frac{9}{16}$	$\frac{6}{16}$	3	$21 \times \frac{7}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$4 \times 4 \times \frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3 \times 3 \times \frac{6}{16}$
18,000 and under 21,000	$36 \times \frac{9}{16}$	$\frac{6}{16}$	3	$22 \times \frac{7}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$4 \times 4 \times \frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3 \times 3 \times \frac{7}{16}$
21,000 and under 24,000	$38 \times \frac{10}{16}$	$\frac{6}{16}$	3	$24 \times \frac{7}{16}$	$\frac{9}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$4 \times 4 \times \frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$
24,000 and under 28,000	$40 \times \frac{10}{16}$	$\frac{7}{16}$	3	$26 \times \frac{7}{16}$	$\frac{9}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{7}{16}$	$4 \times 4 \times \frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$
28,000 and under 33,000	$42 \times \frac{10}{16}$	$\frac{7}{16}$	3	$28 \times \frac{8}{16}$	$\frac{9}{16}$	$\frac{8}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	$4 \times 4 \times \frac{9}{16}$	$4 \times 4 \times \frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$
33,000 and under 38,000	$44 \times \frac{10}{16}$	$\frac{7}{16}$	4	$30 \times \frac{8}{16}$	$\frac{10}{16}$	$\frac{8}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	$4 \times 4 \times \frac{9}{16}$	$4 \times 4 \times \frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$
38,000 and under 44,000	$46 \times \frac{10}{16}$	$\frac{8 \text{ to } 7}{16}$	4	$32 \times \frac{9}{16}$	$\frac{10}{16}$	$\frac{8}{16}$	$\frac{8}{16}$	$\frac{8 \text{ to } 7}{16}$	$\frac{8 \text{ to } 7}{16}$	$4 \times 4 \times \frac{10}{16}$	$4 \times 4 \times \frac{10}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{16}$
44,000 and under 51,000	$48 \times \frac{11}{16}$	$\frac{8}{16}$	4	$34 \times \frac{10}{16}$	$\frac{11}{16}$	$\frac{9}{16}$	$\frac{8}{16}$	$\frac{8}{16}$	$\frac{8}{16}$	$4 \times 4 \times \frac{10}{16}$	$4 \times 4 \times \frac{10}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{16}$

(*a*) Where Flat Plate Keels are adopted, the Angles connecting the same to the centre Plate are to be of the size required for Middle Line Keelsons in Table G 3.
(*b*) The breadth of the Middle Line Strake of the inner bottom plating to be not less than that given for Garboard Strakes in Table G 2.
The Floor plates and other parts of the inner bottom in the Boiler space to be $\frac{1}{16}$th of an inch thicker than given in the above Table.

Lloyd's Register of Shipping,
2, White Lion Court, Cornhill, London, E.C.
13th April, 1893.

Table of Scantlings for DOUBLE BOTTOMS CONSTRUCTED ON THE CELLULAR SYSTEM.

PLATING NUMBER FOR REGULATING SCANTLINGS. (*See Section 2.*)	Centre Girder. — Depth above Top of Keel and Thickness.	Thickness of Side Girders	Number of Side Girders (exclusive of Margin Plates) on each side, with Floors at alternate Frames.	Margin Plate. — Depth (exclusive of Flange) and Thickness.	Thickness of Inner Bottom Plating. In Engine and Boiler Space, and Middle Line Strake, for Half Length Amidships (*b*)	Thickness of Inner Bottom Plating. Middle Line Strake at Ends.	Thickness of Inner Bottom Plating. Remainder of Plating before and abaft the Engine and Boiler Space.	Thickness of Brack't or Floor Plates.	Dimensions of Angle Bars. On Centre Girder. (*a*)	Dimensions of Angle Bars. On Margin Plates.	Dimensions of Angle Bars. On Side Girders, Intermediate, and Vertical Angle Bars.
	inches.	inches.		inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
Under 11,000	$32 \times \frac{8}{20}$	$\frac{6}{20}$	2	$18 \times \frac{6}{20}$	$\frac{7}{20}$	$\frac{6}{20}$	$\frac{6}{20}$	$\frac{6}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$3 \times 3 \times \frac{7}{20}$	$3 \times 2\frac{1}{2} \times \frac{6}{20}$
11,000 and under 13,000	$33 \times \frac{8}{20}$	$\frac{6}{20}$	2	$19 \times \frac{7}{20}$	$\frac{8}{20}$	$\frac{6}{20}$	$\frac{6}{20}$	$\frac{6}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$3 \times 2\frac{1}{2} \times \frac{7}{20}$
13,000 and under 15,000	$34 \times \frac{8}{20}$	$\frac{6}{20}$	3	$20 \times \frac{7}{20}$	$\frac{8}{20}$	$\frac{7}{20}$	$\frac{7}{20}$	$\frac{6}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$	$3 \times 3 \times \frac{7}{20}$
15,000 and under 18,000	$35 \times \frac{9}{20}$	$\frac{7}{20}$	3	$21 \times \frac{7}{20}$	$\frac{8}{20}$	$\frac{7}{20}$	$\frac{7}{20}$	$\frac{7}{20}$	$4 \times 4 \times \frac{8}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$3 \times 3 \times \frac{7}{20}$
18,000 and under 21,000	$36 \times \frac{9}{20}$	$\frac{7}{20}$	3	$22 \times \frac{8}{20}$	$\frac{8}{20}$	$\frac{7}{20}$	$\frac{7}{20}$	$\frac{7}{20}$	$4 \times 4 \times \frac{9}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$3 \times 3 \times \frac{7}{20}$
21,000 and under 24,000	$38 \times \frac{10}{20}$	$\frac{7}{20}$	3	$24 \times \frac{8}{20}$	$\frac{9}{20}$	$\frac{8}{20}$	$\frac{7}{20}$	$\frac{7}{20}$	$4 \times 4 \times \frac{9}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$
24,000 and under 28,000	$40 \times \frac{10}{20}$	$\frac{7}{20}$	3	$26 \times \frac{8}{20}$	$\frac{9}{20}$	$\frac{8}{20}$	$\frac{7}{20}$	$\frac{7}{20}$	$4 \times 4 \times \frac{9}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{20}$
28,000 and under 33,000	$42 \times \frac{10}{20}$	$\frac{8}{20}$	3	$28 \times \frac{8}{20}$	$\frac{10}{20}$	$\frac{8}{20}$	$\frac{8}{20}$ to $\frac{7}{20}$	$\frac{8}{20}$	$4 \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$
33,000 and under 38,000	$44 \times \frac{10}{20}$	$\frac{8}{20}$	4	$30 \times \frac{9}{20}$	$\frac{10}{20}$	$\frac{8}{20}$	$\frac{8}{20}$ to $\frac{7}{20}$	$\frac{8}{20}$	$4 \times 4 \times \frac{9}{20}$	$4 \times 4 \times \frac{9}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{20}$
38,000 and under 44,000	$46 \times \frac{11}{20}$	$\frac{8}{20}$	4	$32 \times \frac{10}{20}$	$\frac{10}{20}$	$\frac{8}{20}$	$\frac{8}{20}$	$\frac{9 \text{ to } 8}{20}$	$4 \times 4 \times \frac{10}{20}$	$4 \times 4 \times \frac{10}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$
44,000 and under 51,000	$48 \times \frac{11}{20}$	$\frac{9 \text{ to } 8}{20}$	4	$34 \times \frac{10}{20}$	$\frac{11}{20}$	$\frac{9}{20}$	$\frac{9}{20}$ to $\frac{8}{20}$	$\frac{9 \text{ to } 8}{20}$	$4 \times 4 \times \frac{10}{20}$	$4 \times 4 \times \frac{10}{20}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{10}{20}$

(*a*) Where Flat Plate Keels are adopted, the Angles connecting the same to the centre Plate are to be of the size required for Middle Line Keelsons in Table S 3.

(*b*) The breadth of the Middle Line Strake of the Inner Bottom Plating to be not less than that given for Garboard Strakes in Table S 2.

Where Flanged Plates are adopted for Floors, Brackets, Intercostal Plates, &c., as a substitute for fitting angles on the edges, such Plates are to be $\frac{1}{20}$ of an inch thicker than that given in the Table, and the *faying surface* should not be less than the breadth of the flange of the angle required by the rule.

The Floor plates and other parts of the inner bottom in the Boiler space $\frac{1}{20}$th of an inch thicker than given in the above Table.

LLOYD'S REGISTER OF SHIPPING, 2, WHITE LION COURT, CORNHILL, LONDON, E.C.

April 13th, 1893.

STEEL VESSELS.

Showing Diameters and Spacing of Rivets and

	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Thickness of PLATES	$\frac{5}{20}$	$\frac{6}{20}$	$\frac{6}{20}$ & $\frac{7}{20}$	$\frac{7}{20}$	$\frac{8}{20}$	$\frac{9}{20}$	$\frac{9}{20}$ & $\frac{10}{20}$	$\frac{10}{20}$
Diameter of RIVETS	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$
Breadth of TREBLE riveted STRAPS in inches	...	...	...	...	$14\frac{1}{4}$	$14\frac{1}{4}$	$14\frac{1}{4}$	$16\frac{3}{4}$
,, ,, DOUBLE ,, ,, ,,	8	8	$9\frac{3}{4}$	$9\frac{3}{4}$	$9\frac{3}{4}$	$9\frac{3}{4}$	$9\frac{3}{4}$	$11\frac{1}{4}$
,, ,, TREBLE ,, BUTT LAPS ,,	...	...	...	...	$7\frac{1}{2}$	$7\frac{1}{2}$	$7\frac{1}{2}$	9
,, ,, DOUBLE ,, ,, ,,	$4\frac{1}{4}$	$4\frac{1}{4}$	5	5	5	5	5	6
,, ,, DOUBLE ,, EDGE LAPS ,,	$3\frac{3}{4}$	$3\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{4}$
,, ,, SINGLE ,, ,, ,,	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	...	...	...
MAXIMUM Spacing of Rivets from centre to centre: In BUTTS of outside plating	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$3\frac{1}{8}$
In EDGES (forward and aft)	$2\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	4
In FRAMES, REVERSED FRAMES, FLOORS, KEELSONS, and BEAM ANGLES.	$4\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{1}{4}$	$6\frac{1}{4}$

Minimum Number of Rivets in Edges of Plating

	NUMBER OF RIVETS							
DIAMETER OF RIVETS	ins. $\frac{5}{8}$	ins. $\frac{5}{8}$	ins. $\frac{3}{4}$	ins. $\frac{3}{4}$	ins. $\frac{3}{4}$	ins. $\frac{3}{4}$	ins. $\frac{3}{4}$	ins. $\frac{7}{8}$
Spacing of FRAMES 20 ins.	7	7	5	5	5	5	...	...
,, ,, ,, 21 ,,	...	7	6	6	6	6	6	5
,, ,, ,, 22 ,,	...	...	6	6	6	6	6	5
,, ,, ,, 23 ,,	...	...	6	6	6	6	6	5
,, ,, ,, 24 ,,	...	...	7	7	7	7	7	6
,, ,, ,, 25 ,,	...	...	...	...	...	...	...	6
,, ,, ,, 26 ,,	...	...	...	...	...	...	...	...

Where the fore and aft flange of the frame does not exceed 3 *inches, the rivets attaching the outside plating thereto should not exceed* $\frac{7}{8}$ *inch in diameter, and where it is* $3\frac{1}{2}$ *inches wide, they should not exceed* 1 *inch in diameter.*

RIVETS to be $\frac{1}{4}$ of an inch larger in diameter in the **STEM, STERN FRAME,** and **KEEL,** but in no case need these exceed $1\frac{1}{4}$ inches in diameter, and to be spaced 5 diameters apart.

RIVETS in **RUDDER** to be of not less size than required for the upper edge of garboard strake amidships, spaced not more than 5 diameters apart.

RIVETS connecting flat **KEEL PLATES** and the fore and aft **ANGLES** to be spaced not more than 5 diameters apart.

Lloyd's Register of Shipping, 2, White Lion Court, Cornhill, London, E.C., 1st October, 1891.

Breadths of Straps, Lapped Butts and Edge Laps.

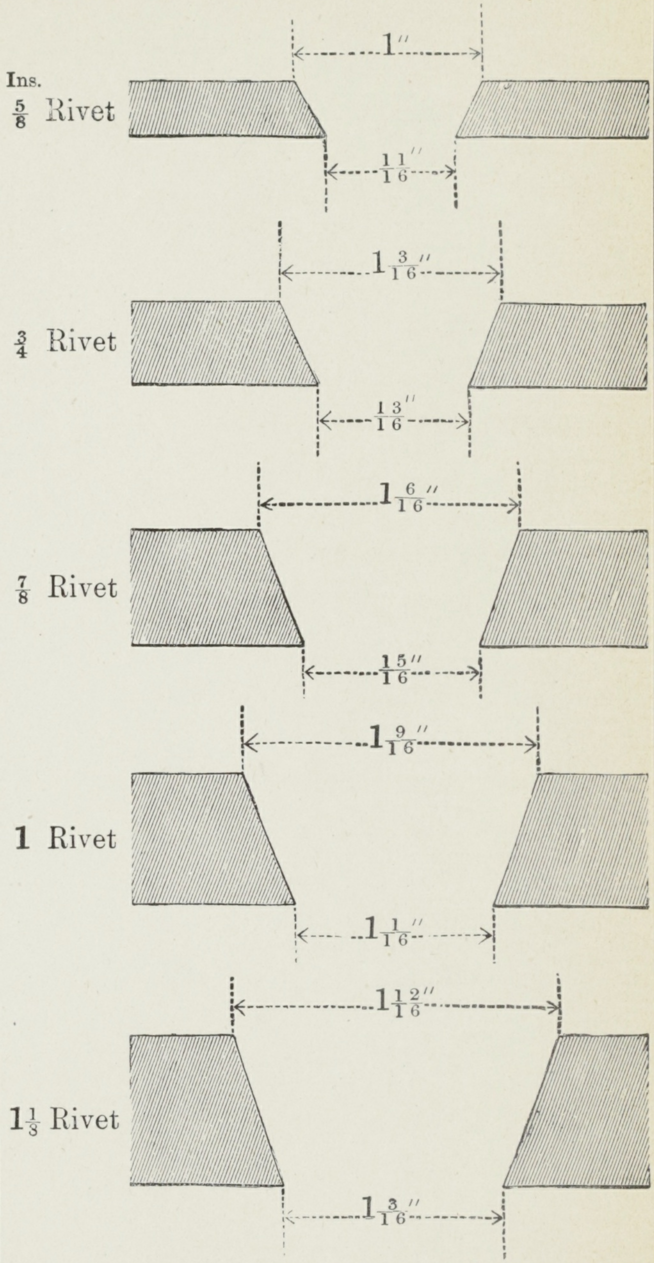
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
$\frac{11}{20}$	$\frac{12}{20}$	$\frac{12}{20}$ & $\frac{13}{20}$	$\frac{13}{20}$	$\frac{14}{20}$	$\frac{14}{20}$ & $\frac{15}{20}$	$\frac{15}{20}$	$\frac{16}{20}$
$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	1	1
$16\frac{3}{4}$	$16\frac{3}{4}$	$16\frac{3}{4}$	$16\frac{3}{4}$	19	19	19	19
$11\frac{1}{4}$	$11\frac{1}{4}$	$11\frac{1}{4}$	$11\frac{1}{4}$	...	...	...	...
9	9	9	9	$10\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$
6	6	6	6	...	...	...	...
$5\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{1}{4}$	6	6	6	6
...	...	...	...	...	...	...	...
$3\frac{1}{8}$	$3\frac{1}{8}$	$3\frac{1}{8}$	$3\frac{1}{8}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$
4	4	4	4	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$
$6\frac{1}{4}$	$6\frac{1}{4}$	$6\frac{1}{4}$	$6\frac{1}{4}$	7	7	7	7

between Frames **AMIDSHIPS.**

IN EACH ROW.

ins. $\frac{7}{8}$	ins. $\frac{7}{8}$	ins. $\frac{7}{8}$	ins. $\frac{7}{8}$	ins. 1	ins. 1	ins. 1	ins. 1
...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...
5	5	5	5	...	...	...	...
5	5	5	5	5	5	5	5
6	6	6	6	5	5	5	5
6	6	6	6	5	5	5	5
...	...	6	6	5	5	5	5

Size of Countersink for Rivets in Outside Plating.



RIVETS in the **BUTTS** of deck plating to be spaced 4 diameters, and in the edges 4 to $4\frac{1}{2}$ diameters apart.

RIVETS in the **BUTTS** and **EDGES** of inner bottom plating, and in butts of girders, to be spaced not more than 4 diameters apart.

RIVETS in the **LANDS** and **BUTTS** of mast plates to be spaced 5 diameters apart.

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IRON AND STEEL MASTS.

	EXTREME LENGTH (*See Footnote*).	PARTNERS.			HEEL.			HOUNDS.			HEAD.			Sizes of Angle Bars in Masts.	
		Diam.	Thickness.		Diam.	Thickness.		Diam.	Thickness.		Diam.	Thickness.			
			Iron.	Steel.		Iron.	Steel.		Iron.	Steel.		Iron.	Steel.	Iron.	Steel.
	Ft.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
	48	16	5/16	6/20	13	4/16	5/20	13½	4/16	5/20	11	3/16	3/16	...	...
Two Plates in the Round.	51	17	5/16	6/20	13½	4/16	5/20	14	4/16	5/20	11½	4/16	5/20	...	...
	54	18	5/16	6/20	14	4/16	5/20	15	4/16	5/20	12	4/16	5/20	...	...
	57	19	6/16	7/20	15	5/16	6/20	15½	5/16	6/20	12½	4/16	5/20	...	...
	60	20	6/16	7/20	16	5/16	6/20	16½	5/16	6/20	13½	5/16	6/20	...	...
	63	21	6/16	7/20	16½	5/16	6/20	17½	5/16	6/20	14	5/16	6/20	...	...
	66	22	6/16	7/20	17	5/16	6/20	18½	5/16	6/20	14½	5/16	6/20	...	...
	69	23	6/16	7/20	18	5/16	6/20	19	5/16	6/20	15½	5/16	6/20	...	...
	72	24	6/16	7/20	19	5/16	6/20	20	5/16	6/20	16	5/16	6/20	...	...
Three Plates in the Round.	75	25	7/16	8/20	19½	6/16	7/20	21	6/16	7/20	16½	6/16	7/20	...	...
	78	26	7/16	8/20	20	6/16	7/20	21½	6/16	7/20	17½	6/16	7/20	...	...
	81	27	8/16	9/20	21	6/16	7/20	22½	6/16	7/20	18	6/16	7/20	...	...
	84	28	8/16	9/20	22	6/16	7/20	23	6/16	7/20	18½	6/16	7/20	3½ × 3 × 7/16	3½ × 3 ×
	87	29	8/16	9/20	22½	6/16	7/20	24	6/16	7/20	19½	6/16	7/20	4 × 3 × 7/16	4 × 3 ×
	90	30	8/16	9/20	23	7/16	8/20	25	7/16	8/20	20	6/16	7/20	4 × 3 × 8/16	4 × 3 ×
	93	31	9/16	10/20	24	7/16	8/20	26	7/16	8/20	20½	6/16	7/20	4½ × 3 × 8/16	4½ × 3 ×
	96	32	9/16	10/20	25	7/16	8/20	26½	7/16	8/20	21	6/16	7/20	5 × 3 × 8/16	5 × 3 ×

FOOTNOTE.—The length for regulating the scantlings of the ma

RULES FOR THE CONSTRUCTION OF IRO

1. If Iron be used in the construction of masts, bowsprits, and yards, it is to be of good malleable quality quite free from surface other defects, and to stand a tensile strain of 20 tons to the square inch and the following bending tests when cold without fracture:—

THICKNESS OF PLATES	TO BEND COLD THROUGH AN ANGLE OF	
	With the Grain.	Across the Grain.
9/16	25°	8°
8/16	30°	11°
7/16	37°	13°
6/16	47°	15°
5/16	55°	17°
4/16	65°	20°
3/16	70°	25°

2. The plates to be bent over a slab, the corner of which should be rounded with a radi of half an inch.

3. If Steel be adopted it is to be of the quality required for ship plates and subjected the same tests.

4. LOWER MASTS.—The plating to be of the thickness, and the plates arranged as in t Table. The seams to be double riveted; in masts of less length than 84 feet, the edges m be single riveted provided angle bars be fitted to the satisfaction of the Committee. T butts below the mast partners in masts, and those inside the wedging of bowsprits, might double riveted, the remainder should be treble riveted.

5. The buttstraps in all cases should be $\frac{1}{16}$ of an inch thicker than the plates they conne in iron masts; in steel masts the buttstraps should be $\frac{1}{20}$ of an inch thicker than the plates double riveted butts and $\frac{2}{20}$ thicker in treble riveted butts. The buttstraps would be better be fitted on the outside of the masts and bowsprit.

6. The mast and bowsprit plates should be doubled all round in way of the wedging, otherwise efficiently strengthened; where masts are wedged at the lower deck, the doubli should extend from below the lower deck to above the upper deck.

7. The heels of all masts and their steps should be efficiently strengthened. The chee of masts should be stiffened by angles or cope iron on their foremost edges; or by some other approved plan.

8. Where two plates in the round are adopted instead of three, the iron is to be of such superior quality as to admit of its bei bent to the required form, without being unduly heated and without fracture, and in all such cases the masts should be additiona stiffened by 3 angles as provided for in the Tables.

Lloyd's Register of British & Foreign Shipping, 2, White Lion Court, Cornhill, London, E.C.—28th April,

CHEEKS.			
Th'kn'ss of Plate.		Sizes of Angle Bar.	
Irn.	Stl.	Iron.	Steel.
ins.	ins.	ins.	ins.
$\frac{7}{16}$	$\frac{8}{20}$	$3\frac{1}{2} \times 2\frac{1}{2} \times \frac{6}{16}$	$3\frac{1}{2} \times 2\frac{1}{2} \times \frac{7}{20}$
$\frac{7}{16}$	$\frac{8}{20}$	$3\frac{1}{2} \times 3 \times \frac{6}{16}$	$3\frac{1}{2} \times 3 \times \frac{7}{20}$
$\frac{7}{16}$	$\frac{8}{20}$	$3\frac{1}{2} \times 3 \times \frac{6}{16}$	$3\frac{1}{2} \times 3 \times \frac{7}{20}$
$\frac{8}{16}$	$\frac{9}{20}$	$4 \times 3 \times \frac{7}{16}$	$4 \times 3 \times \frac{8}{20}$
$\frac{8}{16}$	$\frac{9}{20}$	$4 \times 3 \times \frac{7}{16}$	$4 \times 3 \times \frac{8}{20}$
$\frac{8}{16}$	$\frac{9}{20}$	$4 \times 3 \times \frac{7}{16}$	$4 \times 3 \times \frac{8}{20}$
$\frac{8}{16}$	$\frac{9}{20}$	$4\frac{1}{2} \times 3 \times \frac{7}{16}$	$4\frac{1}{2} \times 3 \times \frac{8}{20}$
$\frac{8}{16}$	$\frac{9}{20}$	$4\frac{1}{2} \times 3 \times \frac{8}{16}$	$4\frac{1}{2} \times 3 \times \frac{9}{20}$
$\frac{8}{16}$	$\frac{9}{20}$	$4\frac{1}{2} \times 3 \times \frac{8}{16}$	$4\frac{1}{2} \times 3 \times \frac{9}{20}$
$\frac{9}{16}$	$\frac{10}{20}$	$5 \times 3 \times \frac{8}{16}$	$5 \times 3 \times \frac{9}{20}$
$\frac{9}{16}$	$\frac{10}{20}$	$5 \times 3 \times \frac{9}{16}$	$5 \times 3 \times \frac{10}{20}$
$\frac{9}{16}$	$\frac{10}{20}$	$5 \times 3\frac{1}{2} \times \frac{9}{16}$	$5 \times 3\frac{1}{2} \times \frac{10}{20}$
$\frac{10}{16}$	$\frac{11}{20}$	$5 \times 3\frac{1}{2} \times \frac{9}{16}$	$5 \times 3\frac{1}{2} \times \frac{10}{20}$
$\frac{10}{16}$	$\frac{11}{20}$	$5\frac{1}{2} \times 4 \times \frac{10}{16}$	$5\frac{1}{2} \times 4 \times \frac{11}{20}$
$\frac{10}{16}$	$\frac{11}{20}$	$6 \times 4 \times \frac{10}{16}$	$6 \times 4 \times \frac{11}{20}$
$\frac{11}{16}$	$\frac{12}{20}$	$6 \times 4 \times \frac{10}{16}$	$6 \times 4 \times \frac{11}{20}$
$\frac{11}{16}$	$\frac{12}{20}$	$6 \times 4 \times \frac{10}{16}$	$6 \times 4 \times \frac{11}{20}$

IRON AND STEEL BOWSPRITS.

LENGTH OUTSIDE BED.	BED.			HEEL.			CAP.			Sizes of Angle Bar.	
	Diam.	Th'kn'ss		Diam.	Th'kn'ss		Diam.	Th'kn'ss		Iron.	Steel.
		Irn.	Stl.		Irn.	Stl.		Irn.	Stl.		
Ft.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
14	$16\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	14	$\frac{5}{16}$	$\frac{6}{20}$	12	$\frac{4}{16}$	$\frac{5}{20}$	$2\frac{1}{2} \times 2 \times \frac{5}{16}$	$2\frac{1}{2} \times 2 \times \frac{6}{20}$
15	$17\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	15	$\frac{5}{16}$	$\frac{6}{20}$	$12\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	$2\frac{1}{2} \times 2 \times \frac{5}{16}$	$2\frac{1}{2} \times 2 \times \frac{6}{20}$
16	19	$\frac{5}{16}$	$\frac{6}{20}$	16	$\frac{5}{16}$	$\frac{6}{20}$	13	$\frac{5}{16}$	$\frac{6}{20}$	$3 \times 2 \times \frac{5}{16}$	$3 \times 2 \times \frac{6}{20}$
17	20	$\frac{6}{16}$	$\frac{7}{20}$	17	$\frac{6}{16}$	$\frac{7}{20}$	14	$\frac{5}{16}$	$\frac{6}{20}$	$3 \times 2 \times \frac{5}{16}$	$3 \times 2 \times \frac{6}{20}$
18	$21\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	18	$\frac{6}{16}$	$\frac{7}{20}$	15	$\frac{5}{16}$	$\frac{6}{20}$	$3 \times 2\frac{1}{2} \times \frac{5}{16}$	$3 \times 2\frac{1}{2} \times \frac{6}{20}$
19	23	$\frac{6}{16}$	$\frac{7}{20}$	19	$\frac{6}{16}$	$\frac{7}{20}$	16	$\frac{5}{16}$	$\frac{6}{20}$	$3 \times 3 \times \frac{6}{16}$	$3 \times 3 \times \frac{7}{20}$
20	$24\frac{1}{2}$	$\frac{7}{16}$	$\frac{8}{20}$	20	$\frac{6}{16}$	$\frac{7}{20}$	$16\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$3\frac{1}{2} \times 3 \times \frac{6}{16}$	$3\frac{1}{2} \times 3 \times \frac{7}{20}$
21	$25\frac{1}{2}$	$\frac{7}{16}$	$\frac{8}{20}$	21	$\frac{6}{16}$	$\frac{7}{20}$	$17\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$3\frac{1}{2} \times 3 \times \frac{6}{16}$	$3\frac{1}{2} \times 3 \times \frac{7}{20}$
22	$26\frac{1}{2}$	$\frac{7}{16}$	$\frac{8}{20}$	22	$\frac{6}{16}$	$\frac{7}{20}$	$18\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$4 \times 3 \times \frac{7}{16}$	$4 \times 3 \times \frac{8}{20}$
23	28	$\frac{8}{16}$	$\frac{9}{20}$	23	$\frac{7}{16}$	$\frac{8}{20}$	19	$\frac{6}{16}$	$\frac{7}{20}$	$4 \times 3\frac{1}{2} \times \frac{7}{16}$	$4 \times 3\frac{1}{2} \times \frac{8}{20}$
24	29	$\frac{8}{16}$	$\frac{9}{20}$	24	$\frac{7}{16}$	$\frac{8}{20}$	20	$\frac{6}{16}$	$\frac{7}{20}$	$4 \times 3\frac{1}{2} \times \frac{7}{16}$	$4 \times 3\frac{1}{2} \times \frac{8}{20}$
25	30	$\frac{8}{16}$	$\frac{9}{20}$	25	$\frac{7}{16}$	$\frac{8}{20}$	21	$\frac{6}{16}$	$\frac{7}{20}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$
26	$31\frac{1}{2}$	$\frac{8}{16}$	$\frac{9}{20}$	26	$\frac{7}{16}$	$\frac{8}{20}$	$21\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$
27	33	$\frac{8}{16}$	$\frac{9}{20}$	27	$\frac{7}{16}$	$\frac{8}{20}$	22	$\frac{6}{16}$	$\frac{7}{20}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{9}{20}$

to be taken, in all cases, from the cap to the top of the keelson.

AND STEEL MASTS, BOWSPRITS, AND YARDS.

9. All masts of 84 feet length and above, to be fitted with angles properly shifted and extending the whole length of the mast. If the plates be arranged as described in the Tables, there should be an angle bar fitted to each plate in the round, of the size given in the Table.

10. All bowsprits exceeding 28 inches in diameter should have a vertical diaphragm plate extending from within the wedging to the gammoning, connected by continuous single angle bars to the upper and lower parts of the bowsprit, and two additional angle bars of the size given in the Table; and bowsprits 28 inches in diameter and under, to have an angle bar at the centre of each plate extending the whole length of the bowsprit.

11. The diameter of the lower masts at the cap to be in no case less than that of the topmast at this place, or of the lower topsail yard.

12. The attention of the Surveyors is to be specially directed to the fittings connected with the masts and rigging, in order to ensure the workmanship, material, and sizes of the same being efficient.

13. The mizenmasts for barques may be reduced one-fifth in diameter from that given in the Table, and the plating to be not less than the thickness corresponding to the diameters.

14. Where a Steamer is intended to be fitted with masts or a bowsprit for auxiliary purposes, they may be one-eighth less in diameter than prescribed by Table; and when a mast of a steamer is to carry fore and aft sail only, the diameter may be one-fifth less than given in the Table. The seams of these masts may be single riveted.

15. When pole masts are fitted, the length of the lower mast, in determining the diameter and thickness of plating, should be taken from the heel to the cap band, so as to include the head, as in an ordinary mast; and in sailing vessels these masts to be additionally strengthened by angles from below the lower yard to the topmast cap, or compensating strength furnished. The cheek plates in pole masts may be of the same thickness as the mast plates at the hounds.

16. The eye-bolts, hoops, cleats and bands, are to be of the best description of wrought iron.

17. Any deviations from these Rules and Tables must be submitted for the consideration of the Committee.

Sizes and Scantlings for YARDS and TOPMASTS of SAILING VESSELS

YARDS.

Length Cleated.	Centre.			First Quarter.			Second Quarter.			Third Quarter.			Ends at Cleats.		
	Diameter.	Thickness.		Diameter.	Thickness.		Diameter.	Thickness.		Diameter.	Thickness.		Diameter.	Thickness.	
		Iron.	Steel.		Iron.	Steel.		Iron.	Steel.		Iron.	Steel.		Iron.	Steel.
Feet.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
32	8	$\frac{3}{16}$	$\frac{3}{16}$	$7\frac{7}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$7\frac{1}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	6	$\frac{3}{16}$	$\frac{3}{16}$	4	$\frac{2}{16}$	$\frac{2}{16}$
36	9	$\frac{3}{16}$	$\frac{3}{16}$	$8\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	$8\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$6\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	$4\frac{1}{2}$	$\frac{2}{16}$	$\frac{2}{16}$
40	10	$\frac{3}{16}$	$\frac{3}{16}$	$9\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	9	$\frac{3}{16}$	$\frac{3}{16}$	$7\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{16}$	5	$\frac{2}{16}$	$\frac{2}{16}$
44	11	$\frac{3}{16}$	$\frac{3}{16}$	$10\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	10	$\frac{3}{16}$	$\frac{3}{16}$	$8\frac{1}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	$5\frac{1}{2}$	$\frac{2}{16}$	$\frac{2}{16}$
48	12	$\frac{4}{16}$	$\frac{5}{20}$	$11\frac{3}{4}$	$\frac{4}{16}$	$\frac{5}{20}$	$10\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	9	$\frac{3}{16}$	$\frac{3}{16}$	6	$\frac{2}{16}$	$\frac{2}{16}$
52	13	$\frac{4}{16}$	$\frac{5}{20}$	$12\frac{5}{8}$	$\frac{4}{16}$	$\frac{5}{20}$	$11\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	$9\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	$6\frac{1}{2}$	$\frac{2}{16}$	$\frac{2}{16}$
56	14	$\frac{4}{16}$	$\frac{5}{20}$	$13\frac{5}{8}$	$\frac{4}{16}$	$\frac{5}{20}$	$12\frac{5}{8}$	$\frac{4}{16}$	$\frac{5}{20}$	$10\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{16}$	7	$\frac{2}{16}$	$\frac{2}{16}$
60	15	$\frac{4}{16}$	$\frac{5}{20}$	$14\frac{5}{8}$	$\frac{4}{16}$	$\frac{5}{20}$	$13\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	$11\frac{1}{4}$	$\frac{3}{16}$	$\frac{3}{16}$	$7\frac{1}{2}$	$\frac{2}{16}$	$\frac{2}{16}$
64	16	$\frac{5}{16}$	$\frac{6}{20}$	$15\frac{5}{8}$	$\frac{5}{16}$	$\frac{6}{20}$	$14\frac{3}{8}$	$\frac{5}{16}$	$\frac{6}{20}$	12	$\frac{4}{16}$	$\frac{5}{20}$	8	$\frac{3}{16}$	$\frac{3}{16}$
68	17	$\frac{5}{16}$	$\frac{6}{20}$	$16\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	$15\frac{1}{4}$	$\frac{5}{16}$	$\frac{6}{20}$	$12\frac{3}{4}$	$\frac{4}{16}$	$\frac{5}{20}$	$8\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{16}$
72	18	$\frac{5}{16}$	$\frac{6}{20}$	$17\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	$16\frac{1}{4}$	$\frac{5}{16}$	$\frac{6}{20}$	$13\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	9	$\frac{3}{16}$	$\frac{3}{16}$
76	19	$\frac{6}{16}$	$\frac{7}{20}$	$18\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	$17\frac{1}{8}$	$\frac{5}{16}$	$\frac{6}{20}$	$14\frac{1}{4}$	$\frac{4}{16}$	$\frac{5}{20}$	$9\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{16}$
80	20	$\frac{6}{16}$	$\frac{7}{20}$	$19\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	18	$\frac{5}{16}$	$\frac{6}{20}$	15	$\frac{4}{16}$	$\frac{5}{20}$	10	$\frac{3}{16}$	$\frac{3}{16}$
84	21	$\frac{7}{16}$	$\frac{8}{20}$	$20\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	19	$\frac{5}{16}$	$\frac{6}{20}$	$15\frac{3}{4}$	$\frac{5}{16}$	$\frac{6}{20}$	$10\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$
88	22	$\frac{7}{16}$	$\frac{8}{20}$	$21\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$19\frac{3}{4}$	$\frac{5}{16}$	$\frac{6}{20}$	$16\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	11	$\frac{4}{16}$	$\frac{5}{20}$
92	23	$\frac{7}{16}$	$\frac{8}{20}$	$22\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$20\frac{3}{4}$	$\frac{6}{16}$	$\frac{7}{20}$	$17\frac{1}{4}$	$\frac{5}{16}$	$\frac{6}{20}$	$11\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$
96	24	$\frac{7}{16}$	$\frac{8}{20}$	$23\frac{3}{8}$	$\frac{6}{16}$	$\frac{7}{20}$	$21\frac{5}{8}$	$\frac{6}{16}$	$\frac{7}{20}$	18	$\frac{5}{16}$	$\frac{6}{20}$	12	$\frac{4}{16}$	$\frac{5}{20}$

Lloyd's Register of British and Foreign Shipping, 2, White Lion Court, Cornhill,

TABLE 10.

nd FULL-RIGGED STEAM VESSELS.

TOPMASTS.

Length.	Heel. Diameter.	Heel. Thickness. Iron.	Heel. Thickness. Steel.	Lower Part of Head. Diameter.	Lower Part of Head. Thickness. Iron.	Lower Part of Head. Thickness. Steel.	Head. Diameter.	Head. Thickness. Iron.	Head. Thickness. Steel.
Feet.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
32	12	$\frac{4}{16}$	$\frac{5}{20}$	$10\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	9	$\frac{3}{16}$	$\frac{3}{16}$
34	$12\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	11	$\frac{4}{16}$	$\frac{5}{20}$	$9\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{16}$
36	13	$\frac{4}{16}$	$\frac{5}{20}$	$11\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	10	$\frac{3}{16}$	$\frac{3}{16}$
38	14	$\frac{4}{16}$	$\frac{5}{20}$	$12\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	$10\frac{1}{2}$	$\frac{3}{16}$	$\frac{3}{16}$
40	$14\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	13	$\frac{4}{16}$	$\frac{5}{20}$	11	$\frac{3}{16}$	$\frac{3}{16}$
42	15	$\frac{5}{16}$	$\frac{6}{20}$	$13\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	$11\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$
44	16	$\frac{5}{16}$	$\frac{6}{20}$	14	$\frac{4}{16}$	$\frac{5}{20}$	12	$\frac{4}{16}$	$\frac{5}{20}$
46	$16\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	$14\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$	$12\frac{1}{2}$	$\frac{4}{16}$	$\frac{5}{20}$
48	17	$\frac{6}{16}$	$\frac{7}{20}$	15	$\frac{5}{16}$	$\frac{6}{20}$	13	$\frac{5}{16}$	$\frac{6}{20}$
50	18	$\frac{6}{16}$	$\frac{7}{20}$	16	$\frac{5}{16}$	$\frac{6}{20}$	$13\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$
52	$18\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$16\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	14	$\frac{5}{16}$	$\frac{6}{20}$
54	19	$\frac{6}{16}$	$\frac{7}{20}$	17	$\frac{5}{16}$	$\frac{6}{20}$	$14\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$
56	20	$\frac{6}{16}$	$\frac{7}{20}$	18	$\frac{5}{16}$	$\frac{6}{20}$	15	$\frac{5}{16}$	$\frac{6}{20}$
58	$20\frac{1}{2}$	$\frac{6}{16}$	$\frac{7}{20}$	$18\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$	$15\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$
60	21	$\frac{6}{16}$	$\frac{7}{20}$	19	$\frac{5}{16}$	$\frac{6}{20}$	16	$\frac{5}{16}$	$\frac{6}{20}$
62	22	$\frac{6}{16}$	$\frac{7}{20}$	20	$\frac{5}{16}$	$\frac{6}{20}$	$16\frac{1}{2}$	$\frac{5}{16}$	$\frac{6}{20}$
64	23	$\frac{6}{16}$	$\frac{7}{20}$	21	$\frac{5}{16}$	$\frac{6}{20}$	17	$\frac{5}{16}$	$\frac{6}{20}$

London, E.C.—14th December, 1893

TOPMASTS.—The plating should be of the thickness given in the Table. The seams of topmasts may be single riveted; the butts should be treble riveted, and their straps $\frac{1}{16}$ of an inch thicker in iron topmasts, and $\frac{1}{20}$ thicker in steel than the plates they connect. There should be doubling plates in the way of the lower mast cap. Topmasts should be efficiently strengthened in the way of the fid holes, and in the way of sheave holes where such are cut, by the doubling plates, iron hoops, or by other approved methods.

Topmast 38 feet in length and under 46 feet, to have two stiffening angles $3'' \times 2\frac{1}{2}'' \times \frac{6}{16}''$ fitted as nearly as practicable at the fore and after parts of the mast.

Where the length is 46 feet and under 66 feet, the angles to be $3\frac{1}{2}'' \times 3\frac{1}{2}'' \times \frac{6}{16}''$.

When the length of the topmasts exceeds 46 feet, efficient cheek plates are to be fitted to the same.

The diameter of the topmasts at the lower cap, sheave hole, and topmast cap, to be in no case less than that of the yards at these places.

LOWER YARDS.—The plating should be of the thickness given in the Table. The seams of yards may be single riveted; their butts should be treble riveted, and connected by being overlapped, or by efficient butt straps. The plates should be doubled at the centre, and the doubling plates should extend beyond the truss hoops.

Where iron or steel masts and yards are to be constructed otherwise than in accordance with the Tables, plans and particulars of the same must be submitted for the approval of the Committee.

Where Steamers are intended to be fitted with topmasts for auxiliary purposes, they might be one-eighth less in diameter than prescribed by Table.

REGISTER TONNAGE UNDER DECK.	Tons. 3000 AND UNDER 3500		Tons. 2600 AND UNDER 3000		Tons. 2300 AND UNDER 2600		Tons. 2000 AND UNDER 2300		Tons. 1800 AND UNDER 2000		Tons. 1600 AND UNDER 1800		Tons. 1400 AND UN 1600	
PLATING NUMBER.	32000 AND UNDER 36000		29000 AND UNDER 32000		26600 AND UNDER 29000		24200 AND UNDER 26600		22500 AND UNDER 24200		20700 AND UNDER 22500		1880 AND UN 2070	
	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Si inc
FORE & MAIN Shrouds ...	6 and 2 cap	$5\frac{1}{2}$	6 and 2 cap	$5\frac{1}{4}$	6 and cap	5	6 and cap	$4\frac{7}{8}$	6 and cap	$4\frac{3}{4}$	6 and cap	$4\frac{1}{2}$	6 and cap	4
,, ,, Chain plates ...		$2\frac{3}{4}$		$2\frac{5}{8}$		$2\frac{1}{2}$		$2\frac{3}{8}$		$2\frac{1}{4}$		$2\frac{1}{8}$		2
,, ,, Dead-eyes ...		—		—		—		—		12×7		$11\frac{1}{2}\times6\frac{1}{2}$		11×
,, ,, Lanyards (hemp)		—		—		—		—		6		$5\frac{3}{4}$		5
,, ,, Rigging Screws Diameter at bottom of thread		$2\frac{1}{4}$		$2\frac{1}{8}$		2		$1\frac{7}{8}$		$1\frac{7}{8}$		$1\frac{3}{4}$		1
,, ,, Rigging Screws Diameter of Pins		2		$1\frac{7}{8}$		$1\frac{3}{4}$		$1\frac{5}{8}$		$1\frac{5}{8}$		$1\frac{1}{2}$		1
,, ,, Topmst. bckstys.	3	$5\frac{1}{2}$	3	$5\frac{1}{4}$	3	5	3	$4\frac{7}{8}$	3	$4\frac{3}{4}$	3	$4\frac{1}{2}$	3	4
,, ,, Top-gllt. bckstys.	2	$4\frac{1}{4}$	2	$4\frac{1}{8}$	2	$3\frac{7}{8}$	2	$3\frac{3}{4}$	2	$3\frac{1}{2}$	2	$3\frac{1}{4}$	2	3
,, ,, Lower stays ...	2	$5\frac{1}{2}$	2	$5\frac{1}{4}$	2	5	2	$4\frac{7}{8}$	2	$4\frac{3}{4}$	2	$4\frac{1}{2}$	2	4
,, ,, Top-mast stays ...	2	$5\frac{1}{2}$	2	$5\frac{1}{4}$	2	5	2	$4\frac{7}{8}$	2	$4\frac{3}{4}$	2	$4\frac{1}{2}$	2	4
,, ,, Top-gallant stays		$4\frac{1}{4}$		$4\frac{1}{8}$		$3\frac{7}{8}$		$3\frac{3}{4}$		$3\frac{1}{2}$		$3\frac{1}{4}$		3
MIZEN Shrouds	5 and cap	$4\frac{1}{2}$	5 and cap	$4\frac{3}{8}$	5 and cap	$4\frac{1}{4}$	5 and cap	$4\frac{1}{8}$	5 and cap	4	5 and cap	$3\frac{3}{4}$	5 and cap	3
,, Topmast backstays ...	3	$4\frac{1}{2}$	3	$4\frac{3}{8}$	3	$4\frac{1}{4}$	3	$4\frac{1}{8}$	3	4	3	$3\frac{3}{4}$	3	3
,, Top-gallant backstays ...	2	$3\frac{1}{4}$	2	$3\frac{1}{8}$	2	3	2	$2\frac{7}{8}$	2	$2\frac{3}{4}$	2	$2\frac{1}{2}$	2	2
,, Lower stays	2	$4\frac{1}{2}$	2	$4\frac{3}{8}$	2	$4\frac{1}{4}$	2	$4\frac{1}{8}$	2	4	2	$3\frac{3}{4}$	2	3
,, Topmast stays	2	$4\frac{1}{2}$	2	$4\frac{3}{8}$	2	$4\frac{1}{4}$	2	$4\frac{1}{8}$	2	4	2	$3\frac{3}{4}$	2	3
,, Top-gallant stays ...		$3\frac{1}{4}$		$3\frac{1}{8}$		3		$2\frac{7}{8}$		$2\frac{3}{4}$		$2\frac{1}{2}$		2
BOBSTAY Bar		$4\frac{1}{8}$		$4\frac{1}{8}$		4		$3\frac{7}{8}$		$3\frac{3}{4}$		$3\frac{5}{8}$		3
,, Pin		$3\frac{1}{8}$		$3\frac{1}{8}$		3		$2\frac{7}{8}$		$2\frac{3}{4}$		$2\frac{5}{8}$		2
,, Chain		$2\frac{1}{16}$		$2\frac{1}{16}$		2		$1\frac{15}{16}$		$1\frac{14}{16}$		$1\frac{13}{16}$		1
BOWSPRIT Shrouds (Chain) ...	2	$1\frac{1}{8}$	2	$1\frac{1}{8}$	2	$1\frac{1}{16}$	2	$1\frac{1}{16}$	2	1	2	1	2	

1.—The above requirements are intended to apply to vessels in which the dimensions of the masts and yards a such as would not be deemed unusual for vessels of the respective tonnages; where these dimensions are extreme, in other exceptional cases where deviations from the above sizes are required, rigging plans showing the sizes a arrangements of the several parts should be submitted for the approval of the Committee.

2.—Where four masts are adopted instead of three, the tonnage of the vessel may be reduced one-fifth, a where five masts are adopted, one fourth, in obtaining the sizes of Rigging, &c., from the above table.

3.—Where pole masts are adopted in vessels requiring one cap shroud only, an additional cap shroud is to fitted, when the number of lower shrouds may be correspondingly reduced.

4.—Where double top-gallant yards are to be adopted, a topmast cap backstay should be fitted in addition.

Tons. 1200 and under 1400		Tons. 1000 and under 1200		Tons. 800 and under 1000		Tons. 700 and under 800		Tons. 600 and under 700		Tons. 500 and under 600		Tons. 400 and under 500		Tons. 300 and under 400	
16800 and under 18800		14800 and under 16800		12700 and under 14800		11600 and under 12700		10300 and under 11600		9000 and under 10300		7700 and under 9000		6100 and under 7700	
No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.	No.	Size. inches.
6 and cap	4 1/8	6 and cap	4	5 and cap	3 3/4	5 and cap	3 1/2	5 and cap	3 1/4	5	3	4	2 3/4	4	2 1/2
	1 7/8		1 7/8		1 3/4		1 3/4		1 5/8		1 3/8		1 1/4		1 1/4
	10 1/2 × 6		10 × 6		9 1/2 × 5 1/2		9 × 5 1/2		8 1/2 × 5		8 × 5		7 1/2 × 4 1/2		7 × 4 1/2
	5 1/4		5		4 3/4		4 1/2		4 1/4		4		3 3/4		3 1/2
	5/8		1 5/8		1 1/2		1 1/2		1 3/8		1 1/4		1 1/8		1 1/8
	1 3/8		1 3/8		1 3/8		1 3/8		1 1/4		1 1/8		1		1
3	4 1/8	3	4	2	3 3/4	2	3 1/2	2	3 1/4	2	3	2	2 3/4	2	2 1/2
2	2 3/4	2	2 5/8	2	2 1/2		2 3/8		2 1/4		2 1/8		2		1 3/4
2	4 1/8	2	4	2	3 3/4	2	3 1/2	2	3 1/4	2	3	2	2 3/4	2	2 1/2
2	4 1/8	2	4	2	3 3/4	2	3 1/2		3 1/4		3		2 3/4		2 1/2
	2 3/4		2 5/8		2 1/2		2 3/8		2 1/4		2 1/8		2		1 3/4
5 and cap	3 1/4	5	3	5	2 7/8	5	2 3/4	4	2 5/8	4	2 1/2	3	2 3/8	3	2 1/4
3	3 1/4	3	3	2	2 7/8	2	2 3/4	2	2 5/8		2 1/2		2 3/8		2 1/4
2	2 1/8	2	2		1 7/8		1 3/4		1 5/8		1 1/2		1 3/8		1 1/4
2	3 1/4	2	3		2 7/8		2 3/4		2 5/8		2 1/2		2 3/8		2 1/4
2	3 1/4		3		2 7/8		2 3/4		2 5/8		2 1/2		2 3/8		2 1/4
	2 1/8		2		1 7/8		1 3/4		1 5/8		1 1/2		1 3/8		1 1/4
	3 1/4		3		2 1/2		2 1/4		2		2		2		2
	2 1/4		2 1/8		1 7/8		1 5/8		1 1/2		1 1/2		1 1/2		1 1/2
	1 10/16		1 8/16		1 6/16		1 5/16		1 4/16		1 4/16		1 4/16		1 3/16
2	7/8	2	13/16	2	12/16		12/16		11/16		10/16		9/16		9/16

STEEL WIRE STANDING RIGGING.

SIZE.	BREAKING TEST.	SIZE.	BREAKING TEST.
Inches.	Tons.	Inches.	Tons.
5 1/2	58	3 1/8	17 1/2
5 1/4	53	3	16
5	48	2 7/8	14 1/2
4 7/8	44	2 3/4	13
4 3/4	42	2 5/8	12
4 5/8	40	2 1/2	11
4 1/2	38	2 3/8	10
4 3/8	36	2 1/4	9
4 1/4	34	2 1/8	8
4 1/8	32	2	7
4	30	1 7/8	6
3 7/8	28	1 3/4	5 1/2
3 3/4	26	1 5/8	5
3 5/8	24	1 1/2	4
3 1/2	22	1 3/8	3 1/4
3 3/8	20 1/2	1 1/4	3
3 1/4	19		

5.—The steel wire ropes to be guaranteed to withstand the breaking stress given in the table, and no hemp is to be used in the strands, a hemp core only to be fitted.

6.—A short length of each of the wires composing the rigging will be required, after being galvanized, to withstand a tensile stress equivalent to that set forth in the Table, and the aggregate strength of the wires must not be less than 10 per cent. in excess of that stress.

7.—Each wire will be required to be capable of being twisted around itself not less than eight times, and of being untwisted and straightened without breaking.

8.—Where it is proposed to adopt iron wire rigging the sizes proposed and the guaranteed tests should be submitted for the consideration of the Committee.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,
2, White Lion Court, Cornhill, E.C.

13th April, 1893.

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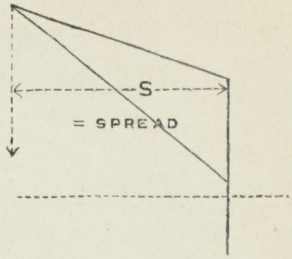
TABLE **12.**

ANCHOR CRANES.



The dimensions of the principal parts of ANCHOR CRANES to be in accordance with the following Table :—

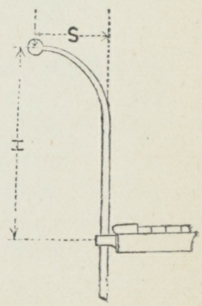
WEIGHT OF ANCHOR INCLUDING STOCK.	SPREAD OF CRANE IN FEET.						
	9	10	11	12	13	14	15
Cwts.	DIAMETER OF MAIN POST AT DECK IN INCHES.						
20	6	$6\frac{1}{4}$	$6\frac{1}{2}$	$6\frac{3}{4}$	$6\frac{3}{4}$	7	$7\frac{1}{4}$
25	$6\frac{1}{2}$	$6\frac{3}{4}$	7	$7\frac{1}{4}$	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$
30	7	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$	$7\frac{3}{4}$	8	$8\frac{1}{4}$
35	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$	8	8	$8\frac{1}{4}$	$8\frac{1}{2}$
40	$7\frac{1}{2}$	$7\frac{3}{4}$	8	$8\frac{1}{4}$	$8\frac{1}{2}$	$8\frac{3}{4}$	9
45	8	$8\frac{1}{4}$	$8\frac{1}{2}$	$8\frac{3}{4}$	9	$9\frac{1}{4}$	$9\frac{1}{2}$
50	$8\frac{1}{4}$	$8\frac{1}{2}$	$8\frac{3}{4}$	9	$9\frac{1}{4}$	$9\frac{1}{2}$	$9\frac{3}{4}$
55	$8\frac{1}{2}$	$8\frac{3}{4}$	9	$9\frac{1}{4}$	$9\frac{1}{2}$	$9\frac{3}{4}$	10
60	$8\frac{3}{4}$	9	$9\frac{1}{4}$	$9\frac{1}{2}$	$9\frac{3}{4}$	10	$10\frac{1}{4}$

CORRESPONDING DIMENSIONS OF MAIN POST, TIE RODS AND JIBS.

	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Diameter of Main Post at deck	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10	$10\frac{1}{2}$
Tie Rod	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{3}{4}$	$2\frac{7}{8}$
Jib (Diameter at middle) ...	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	5	$5\frac{1}{4}$

If two Tie rods are fitted, the diameter of each to be $\frac{3}{4}$th that of the single rod required.

BOATS' DAVITS.



In the cases of Boats and Davits of ordinary proportions the diameter of the davits in inches should be one-fifth of the length of the boats in feet, but in cases where the height and spread of the davits or the dimensions of the boats are not of ordinary proportions, the diameter of the davits in inches should be found from the formula :—

$$\sqrt[3]{\frac{L \times B \times D}{40}\left(\frac{H}{3} + S\right)}$$

where L, B and D are the dimensions of the boat, H the height of the davit above its uppermost point of support, and S the spread of the davit, each of these dimensions being in feet.

Lloyd's Register of British and Foreign Shipping,
2, White Lion Court, Cornhill, London, E.C.
13th April, 1893.

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No. 7.—FORM OF CERTIFICATE OF CHARACTER.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ESTABLISHED 1834.

No. 2, White Lion Court, Cornhill,
No. —— *London, 189*

These are to Certify, That the —————————— of ——————————
—————— Master, —————— Tons, bound to —————— has been Surveyed at —————— by the Surveyors to this Society, and reported to be, on the ——————————
——————————————————
and that she has been CLASSED and entered in the REGISTER BOOK of this Society with the Character
——————————————————

Witness my hand,

—————— *Secretary.* —————— *Chairman.*

Form No. 10.—FORM OF CERTIFICATE OF LLOYD'S MC FOR ENGINES AND BOILERS.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ESTABLISHED 1834.

No. —— *No. 2, White Lion Court, Cornhill,*
London 189

These are to Certify, that the Engines and Boilers of the —————————— of —————————— Master ——— Tons, have been specially Surveyed by the Surveyors to this Society, during construction at —————— and were reported to be on the —————— in good, efficient, and safe working condition at a pressure of —— lbs. per square inch. The Record ✠ Lloyd's MC (in red) ——— (Lloyd's Machinery Certificate), has been made in the Register Book.

Witness my hand,

—————— *Secretary.* —————— *Chairman.*

Form No. 11.—FORM OF CERTIFICATE OF B&MS FOR ENGINES AND BOILERS.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ESTABLISHED 1834.

No. —— *No. 2, White Lion Court, Cornhill,*
London, 189

These are to Certify, that the Boilers of the —————————— of —————— Master ——— Tons, have been Surveyed at —————— in —————— by the Surveyors to this Society, and reported to be in good, efficient, and safe working condition, at a pressure of —— lbs. per square inch. The Survey being completed, the Record B&MS (in red) ——— (Boilers and Machinery Surveyed), has been made in the Register Book.

—————— *Secretary.* *Witness my hand,* —————— *Chairman.*

FORM OF CERTIFICATE OF THE CLASSIFICATION OF SHIPS IN THE LATE UNDERWRITERS' REGISTER OF IRON VESSELS.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.
ESTABLISHED 1834.
Amalgamated 1885 with the Underwriters' Registry of Iron Vessels.
ESTABLISHED 1862.

No. ——   *No. 2, White Lion Court, Cornhill,*
London,   189

This is to Certify, That the ——————————
of ——————, ——— Master, ——— Tons, bound to ——————, has been surveyed at —————— by the Surveyors to this Society, and reported to be on the —————— in a good and efficient state, and fit to carry dry and perishable Cargoes, and that she has been continued as Classed and is entered in the Register Book of this Society with the Character —————— subject to periodical Surveys.

—————— *Secretary.*   *Witness my hand,*

—————— *Chairman.*

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,
AND THE
UNDERWRITERS' REGISTRY FOR IRON VESSELS
AMALGAMATED.

NOTICE IS HEREBY GIVEN that it has been mutually resolved by the Committee of Lloyd's Register of British and Foreign Shipping and the Committee of the Underwriters' Registry for Iron Vessels to amalgamate the two Registries.

In accordance with the terms of amalgamation :—

(1.) The publication of the "Underwriters' List of Iron Vessels" has been discontinued.

(2.) Vessels holding a Class in the Underwriters' Registry will be entitled to the publication of this Class in future issues of Lloyd's Register Book so long as their Owners comply with the Rules of the Underwriters' Registry (1884-5) relating to Periodical Surveys.

(3.) The information hitherto given in the Supplements to the Register Book of the Underwriters' Registry relating to Periodical Surveys, Changes of Owners, &c., will be inserted by posting with type in Lloyd's Register Book, and will also appear in the Supplements.

(4.) In case the Owners of Vessels holding a Class in the Underwriters' Registry only, desire also a class under Lloyd's Register, the Committee of this Society undertake to favourably consider the claims of such Vessels on the documents produced by the Underwriters' Registry, and the necessary surveys as to present condition, with a view to assigning these Vessels the highest possible Class to which they are entitled, free of charge to the Owners. Full allowance will be made for any compensation for deviation from the Rules of Lloyd's Register, and the Vessels given the advantage of any difference in scantlings between the Rules as now existing and those which were in force when the Vessels were built.

The Committee of this Society will employ the Staff of the Underwriters' Registry, so far as may be practicable, in the Survey of Vessels holding a Class in that Registry, and of Vessels now Building or Contracted to be built to Class therein.

In the interest of the Owners of Vessels Classed in the Underwriters' Registry, some Members of the Committee of that Registry will have seats on Lloyd's Register Committees in London and Liverpool.

All communications respecting vessels Classed or now Building to Class in the Underwriters' Registry should in future be addressed to the Secretary to Lloyd's Register, either in London or Liverpool, as may be most convenient.

In the absence of any intimation from Owners of Ships classed in the Underwriters' Registry to the contrary, it will be concluded that they are quite agreeable to the Classes assigned in that Registry being recorded in Lloyd's Register Book as proposed.

By order of the Committee,
B. WAYMOUTH,
Secretary.

Lloyd's Register of British and Foreign Shipping,
2, *White Lion Court, Cornhill, London,*
1*st September*, 1885.

No. 689.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, *White Lion Court, Cornhill, E.C.,*
6th December, 1888.

SURVEY OF ENGINES AND BOILERS.

Dear Sir,

You will doubtless remember that when the late Underwriters' Registry for Iron Vessels was united with this Society's Register, it was agreed that vessels holding a class in the former Registry should be entitled to the publication of this class in future issues of Lloyd's Register Book, so long as their Owners complied with the Rules of the Underwriters' Registry, 1884-5, relating to periodical surveys.

Prior to the two Registers being united, it was contemplated by the Committee of the Underwriters' Registry to appoint Engineer Surveyors to survey the Engines and Boilers of vessels classed in that Registry.

Although, as you are aware, that proposal was not carried out, and Owners of Steam Vessels classed in the late Underwriters' Registry were consequently not liable to such a requirement, some Owners have nevertheless had the Engines and Boilers of their vessels surveyed, and the surveys have afterwards been noted in Lloyd's Register Book.

Under these circumstances, I am directed to intimate that the Committee are quite prepared to give instructions to the Society's Surveyors to survey the Engines and Boilers of the steamer hereunder named, and in the event of their being found, or put into, good condition, to make a notification to that effect in the Register Book.

It is not necessary to point out the advantages of survey by an independent body, but the Committee venture to think that now this subject is brought to your notice you will possibly come to the conclusion that it is to your interest to avail yourself of such a safeguard.

I am, Dear Sir,

Your obedient servant,

B. WAYMOUTH, *Secretary.*

N.B.—The following notations are used to denote that the engines and boilers of steam vessels have been inspected by this Society's Engineer Surveyors, and have been found or put into efficient condition, viz. :—

LMC.—Machinery certified by Lloyd's Register.

B&MS.—Boilers and Machinery surveyed and reported to be satisfactory by the Engineer Surveyors to Lloyd's Register.

✠ Special Survey of Machinery or Boilers during construction (thus ✠LMC. ✠NE&B).

No. 834.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, White Lion Court, Cornhill, E.C.,

14th January, 1892.

SURVEY OF ENGINES AND BOILERS.

DEAR SIR,

On the 6th December, 1888, the Committee of this Society, in a circular letter which is reprinted on the other side, suggested to owners of steam vessels holding a class assigned by the late Underwriters' Registry for Iron vessels that they would do well to submit the machinery and boilers of their vessels to the inspection of the Society's Engineer Surveyors.

Although some owners have seen fit to act upon this suggestion there are many vessels still sailing, the engines and boilers of which have never been surveyed by independent Surveyors, and the Committee therefore think it right again to draw the attention of owners of such vessels to the desirableness of having the engines inspected and certified to by this Society's officers.

I am, Dear Sir,

Yours faithfully,

A. G. DRYHURST,

Secretary.

CIRCULAR NO. 536.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CAST STEEL MAST CAPS.

SIR,

In reference to the use of cast steel mast caps, I am directed to inform you that the Committee of this Society will be prepared to admit of such steel mast caps being fitted to vessels intended to be classed in the Register Book on the following conditions :—

It is requisite that builders proposing to use cast steel mast caps shall, in the first instance, state the name of the firm by whom the caps are to be made, in order that the Committee may be satisfied that the manufacturers have proper facilities for making steel caps of a satisfactory quality.

With this object, the manufacturers will be required to give notice to the Committee when an opportunity can be afforded to the Society's surveyors to attend at the works, in order to report upon the appliances in use and the processes of manufacture, and also to ascertain by crucial tests that the material of which the caps are proposed to be made is of good and ductile quality.

Upon a favourable report being received from the Surveyors, after the inspection of the works of a manufacturer, the Committee will sanction the use of caps of his manufacture, provided test pieces be cast on the caps of sufficient size, to enable the Surveyors to subject the same to such tests as they may deem necessary, in order to satisfy themselves that the material is of good quality. The caps also are to be suspended and severely hammered in the presence of the Surveyors to ensure that the casting is sound in each case.

I am, your obedient servant,

B. WAYMOUTH, *Secretary.*

2, White Lion Court, Cornhill, E.C.,
6th November, 1884.

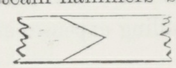
No. 583.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

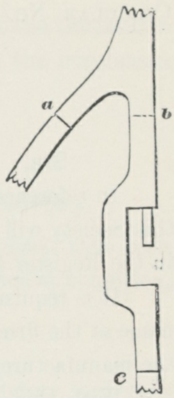
2, White Lion Court, Cornhill, London, E.C.,
January 19th, 1886.

WELDING OF LARGE FORGINGS.

SIR,

The Committee having had under their consideration the subject of the manufacture of Large Forgings for shipbuilding purposes, I am directed to state that from experiments which have been made it has been found that to ensure sound welds in heavy forgings steam hammers should be employed instead of the sledge hammers formerly used ; and the welds when of  form should have the V angle not more than 60°. The old plan of screwing the parts together at a welding heat is not found to be satisfactory, especially in forgings of considerable sectional area, and in view of this, in future the welding of forgings exceeding forty square inches in sectional area will be required by the Committee to be done with steam hammers.

It has been the practice in some works to place the "shut" of the lower part of a stern frame in the sole piece. This is considered to be very objectionable; and the Surveyor should inform manufacturers that the welding should be placed in the lower part of the posts in all cases, and that such connections in the sole piece will not be sanctioned. In Rudder frames the welds of the upper part of the frame to the main piece should not be placed close together as indicated in the sketch at *a, b;* but should be arranged so as to be well clear of each other as indicated by *a, c.*



In cases where stern frames or rudders are taken out of vessels to be repaired, the Surveyors should furnish full particulars of the defects observed, including a sketch shewing the position and nature of the fracture on the Report, for the information of the Committee, so that a record may be kept in this office of all failures in such forgings.

I am, Sir, your obedient servant,

B. WAYMOUTH,

Secretary.

NOTICE.—No. 614.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CHARGES FOR INSPECTION OF FORGINGS.

The following scale of charges has been approved by the General Committee for the inspection of forgings for other than new vessels :—

SHIP FORGINGS OR CASTINGS.

For vessels not exceeding 600 tons	£2	2	0
„ over 600 tons but not exceeding 1600 tons ...	3	3	0
„ over 1600	4	4	0

ENGINE FORGINGS OR CASTINGS.

For shafts up to 12 inches in diameter	£1	1	0
„ over „ „	2	2	0

These fees to be chargeable for the inspection of the whole or any portion of shafting which is not being forged and finished at the works where the engines are being made under the survey of the Society's Officers, and when more than two visits are necessary, to be increased.

N.B.—Travelling expenses are to be charged in the case of both old and new vessels.

By order of the Committee,

BERNARD WAYMOUTH,

Secretary.

2, *White Lion Court, Cornhill, London, E.C.,*
16*th December*, 1886.

(*See Notice No.* 620.)

No. 620.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CHARGES FOR INSPECTING CASTINGS OR FORGINGS AS SET FORTH IN NOTICE No. 614.

In order to obviate misunderstanding arising in regard to the responsibility for the Payment of the Fees recently approved by the Committee of this Society for the inspection of Castings or Forgings, NOTICE IS HEREBY GIVEN that the charges in question, including travelling expenses, will be payable by the Forge or other Company by whom the forgings or castings are made.

By order of the Committee,

B. WAYMOUTH,

Secretary.

2, *White Lion Court, Cornhill, London, E.C.,*
22*nd February*, 1887.

No. 636.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

SURVEY OF REPAIRS OF DAMAGE OF SHIPS OR MACHINERY AT PORTS ABROAD.

DEAR SIR,—I am directed to draw your attention to the fact that it is a condition of the classification of vessels by this Society that all Repairs of Ships or their Machinery that may be required at ports where there is a Surveyor to the Society, in order to the vessels retaining their characters in the Register Book, must be carried out under the inspection and to the satisfaction of the Society's Surveyor.

As the non-observance of this requirement in the case of vessels requiring repairs of damage, &c., at ports abroad has in some instances occasioned inconvenience to Owners, as well as expense of further surveys, I would venture to suggest the advisability of your giving instructions to the Masters of your vessels and to your Agents abroad, in all cases where surveys are required consequent upon damage or otherwise, to call in the Society's local Surveyor to hold such surveys, in order that the vessels' character in the Register Book may be duly maintained.

I may point out that, besides complying with the requirements of the Rules of this Society for the continuance of the classification of vessels, surveys held by the Society's Surveyors abroad will also serve all the purposes of Consular Surveys, which, being, as you are aware, *purely optional*, will not then be necessary.

I am, Dear Sir,

Yours very truly,

B. WAYMOUTH,

Secretary.

2, *White Lion Court, Cornhill, London, E.C.,*
30*th August*, 1887.

NOTICE. No. 673.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

BUNKERS OF IRON AND STEEL SHIPS.

SIR,—The attention of the Committee has recently been drawn to the case of a steel steamer, in which the framing, stringers and beam ends in the Coal Bunker space had almost wasted away through corrosion after a period of only 8 years, during which time, however, it would appear that the vessel inside the bunkers had never been painted.

I am directed to acquaint you that, in view of the above, more than ordinary care is required in surveying bunkers; and you are to draw the attention of owners to the advantage of thoroughly coating such parts with some good preserving composition, such as Stockholm tar sprinkled with Portland cement, or best black varnish—put on the surfaces when clean and dry—in preference to the use of ordinary paint, more particularly in steel vessels in which the scantlings are less than in those built of iron.

I am, Sir,
Your obedient servant,
B. WAYMOUTH,
Secretary.

2, White Lion Court, Cornhill, London, E.C.,
5th May, 1888.

No. 676.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

RECORD OF "EX STEAMER."

With reference to the practice of recording "ex-Steamer" in the Register Book after the names of sailing vessels that have originally been steamers,

Notice is hereby given, that the Committee, who recently had the subject under consideration, have resolved that this practice is to be continued.

The Committee, however, will be prepared to consider representations that may be made of them in regard to sailing vessels that were formerly auxiliary steamers, with a view to determining whether or not the record in question is to be made in the case of such vessels.

By order of the Committee,
B. WAYMOUTH, *Secretary.*

2, White Lion Court, Cornhill, E.C.,
7th June, 1888.

CIRCULAR No. 705.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

STEEL VESSELS.

GENTLEMEN,—With reference to the question of the liability of vessels built of steel to deterioration from corrosion, I am directed to acquaint you that the Committee of this Society, who have had this subject under their notice, think it right to place the results of their experience in regard thereto before owners of this description of property.

It is found that, in cases where the surfaces of vessels built of steel have not been properly scaled in the first instance and then protected with paint of good quality, the material is liable to great deterioration from corrosion, particularly in that portion exposed to the action of salt water. The Committee have no doubt that, with this information in your possession, you will see the desirability of taking the precaution of having new steel vessels belonging to you placed in dry dock and examined, within six months from the date of launching, so that, if symptoms of corrosion are found, the bottom may be properly scaled and coated.

I am also directed to point out the importance of having the inside and outside surfaces of steel vessels kept free from scale, and properly painted.

I am, Gentlemen, your obedient servant,

2, White Lion Court, Cornhill, London, E.C., B. WAYMOUTH, *Secretary.*
7th March, 1889.

CIRCULAR No. 722.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, White Lion Court, Cornhill, E.C.,
1st September, 1889.

PETROLEUM VESSELS.

SIR,

With reference to the testing of the tanks of vessels intended to carry oil, I have to acquaint you that the Committee are of opinion that such tanks should be capable of withstanding a pressure of a head of water 15 feet above the crown of the tank, which would be equal to a pressure of 6lbs. per square inch.

I am, Sir, your obedient servant,

B. WAYMOUTH, *Secretary.*

CIRCULAR No. 773.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, White Lion Court, Cornhill, E.C.,
14th August, 1890.

DOUBLING PLATES IN BOILERS.

SIR,

The attention of the Committee has been drawn to the case of a boiler in which the lower parts of the combustion chambers, instead of having been constructed in the usual manner of one plate of sufficient thickness, was made of a comparatively thin plate strengthened by a doubling plate, with the result that the inner plating became bulged and boiler rendered leaky.

In view of the above I am directed to draw your attention to the necessity of seeing that no doubling plates are fitted in any boiler in positions where they are exposed to the action of the heat of the fires. In such positions the necessary strength should be provided for, if possible, by using a single plate of sufficient thickness, or, where this is impracticable the plates should be strengthened by stays or by L or ⊥ bars.

I am, Sir, your obedient servant,

B. WAYMOUTH, *Secretary.*

CIRCULAR No. 831.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, *White Lion Court, Cornhill, London, E.C.,*
30*th November*, 1891.

OIL-CARRYING VESSELS.

SIR,

I am directed to send for your information results, which the Committee consider may be found useful, of the experience gained by the Officers of this Society respecting the effects on the hulls of some vessels constructed for the purpose of carrying oil in bulk when some of their tanks have been used for carrying water ballast.

It has been found that, in ballasting such vessels with water, the consecutive tanks in some cases have not been run up, and, by thus leaving empty spaces in the main body of the vessel, undue strains have been brought upon the structure at these parts, leading to considerable damage to the vessel.

In other cases, sufficient care has not been taken to ensure that the tanks have been quite filled, and kept filled; and a deep empty tank has even sometimes been run up at sea whilst the vessel was encountering heavy weather. By these means, great strains and damage have been caused from masses of free water being brought against the bulkheads, &c., internally.

It should be borne in mind that carrying liquid in bulk, independently of the nature of the cargo, causes considerably more straining on the plating and riveting of vessels than would occur in carrying general cargo. In the former instance the weight of the cargo is brought only on the outside plating, whereas with general cargo a great portion of the strain is borne by the floors, frames, keelsons, stringers, &c. Great precaution is therefore necessary in oil-carrying vessels to prevent the strains, which are necessarily exceptional, from being materially intensified by the action within the vessel of large quantities of moving oil or water.

It may not be out of place to remark that provision, as regards the trim of the vessel, should be made so that the consecutive tanks in the midship part can be quite filled. These spaces should be sub-divided, particularly at the fore end, to such an extent that the trim of the vessel will admit of the tanks being quite filled, without the statutory depth of loading being exceeded.

Experience has also shown that danger arises from not filling the water spaces at the end of the stokehold with water so as to prevent oil finding its way into the coal bunkers and saturating the coals.

I am, Sir, your obedient servant,

A. G. DRYHURST, *Secretary*.

CIRCULAR No. 832.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, *White Lion Court*, *Cornhill*, *E.C.*,

7th December, 1891.

FEEDERS IN GRAIN-LADEN VESSELS.

SIR,

I am instructed to draw your attention to a case that has recently occurred, in which a grain-laden steamer capsized owing to the giving way of the feeders in the 'tween decks, and a large portion of the grain contained in them being thrown towards one side of the vessel.

In the case in question, the lower holds were completely filled with grain in bulk and the hatchways were utilized as feeders, formed of planks round the hatchways. Additional feeders were also provided at the sides of the vessel extending from the main to the upper deck.

From investigations made by the Officers of this Society it has been found that, as compared with similar vessels loaded in the same manner, the vessel in question had both considerable initial stability, due to her comparatively large metacentric height, and also a good range of stability, due to her large freeboard. There is no reason, therefore, to conclude that the accident was in any way due to an inherent want of stability.

The heeling of the vessel, however, caused by the grain from the feeders being thrown on one side, conduced to the cargo gradually settling down on the depressed side and thus continuously increasing the angle of the heel, until capsizing occurred.

Under these circumstances, it is considered useful to draw the attention of Shipowners to the fact that although feeders are a source of safety in grain laden vessels, in providing for the holds being kept full on the grain settling down, yet if they be not efficiently constructed, and properly shored at the sides and ends, they may lead to danger, as instanced in the case referred to.

I am, Sir, your obedient servant,

A. G. DRYHURST, *Secretary*.

CIRCULAR No. 847.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, White Lion Court, Cornhill, E.C.,
23rd June, 1892.

SIR,

With reference to the cases of vessels in which the steel or iron decks required by the Society's Rules are not carried continuously throughout the length of the vessels, I am directed to acquaint you for your guidance, that in vessels having a raised quarter connected to a bridge house, and requiring by Table S 5 more than one iron or steel deck, the bridge house should extend over not less than the half length amidships, to comply practically with this requirement.

I am, Sir,
Your obedient servant,
A. G. DRYHURST, *Secretary.*

No. 851.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ANCHORS AND CABLES.

NOTICE IS HEREBY GIVEN that the notation of LA&CP (**Lloyd's Anchors and Chains Proved**) is made in the Society's Register Book in the case of Vessels, the **Anchors** and **Chains** of which have been tested at Proving Establishments under the control of the COMMITTEE of LLOYD'S REGISTER OF SHIPPING.

The following establishments are under the control of the Committee :—

Lloyd's Proving House, NETHERTON (nr. Dudley) ...	... *Superintendent*		Mr. H. Green.
	Assistant	,,	Mr. W. J. Relf.
Lloyd's Proving House, TIPTON (Staffordshire) ...	... ...	,,	Mr. C. E. Perrins.
	Assistant	,,	Mr. J. A. Danks.
Lloyd's Proving House, LOW-WALKER-ON-TYNE	... ...	,,	Mr. T. Tindale.
Lloyd's Proving House, CHESTER (Saltney) ...	... ...	,,	Mr. A. S. Jack.
	Assistant	,,	Mr. J. Littler.
Lloyd's Proving House, GLASGOW	... ...	,,	Mr. E. Seedhouse.
Lloyd's Proving House, CARDIFF	... ...	,,	Mr. G. W. Penn.

The notation of A&CP will, as heretofore, be recorded in respect to Anchors and Chain Cables tested at the Sunderland Public Proving Machines.

By order of the Committee,
A. G. DRYHURST, *Secretary.*

2, White Lion Court, Cornhill, London, E.C.,
Revised, June, 1897.

CIRCULAR NO. 852.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, White Lion Court, Cornhill, E.C.,
27th September, 1892.

SIR,

It having recently come to the knowledge of the Committee that, in some vessels where Pitch Pine decks have been fitted, damage to cargo has resulted from leakage, owing to the shrinking of the decks, and to rents and shakes, I am directed to inform you that, in cases where it is intended to fit the weather decks of Pitch Pine in vessels classed, or intended for classification in the Society's Register Book, you are to take steps to ensure that the decks have been well seasoned after being cut.

Special attention should also be directed to the laying of decks of this material and to the caulking of the seams and rents.

I am, Sir, your obedient servant,

A. G. DRYHURST, *Secretary.*

NOTICE NO. 895.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

RECORD OF TEAK DECKS IN THE REGISTER BOOK.

NOTICE IS HEREBY GIVEN that in any case in which the working weather deck of vessels classed under the Two or Three Deck Rule, or Spar Deck or Awning Deck Rules, is of teak, the Committee will be prepared to record the fact in the Society's Register Book (thus "Deck Teak"), upon receiving a request to that effect from the owners, and subject to the deck being examined by the Society's Surveyors, and found to be in good condition.

In the case of a vessel having a bridge house, the deck in the alleyways must in order to render her eligible for the above notation, be of teak, but it is not required that in such cases the Poop, Bridge, and Topgallant Forecastle decks, shall be of East India Teak.

By order of the Committee,

A. G. DRYHURST,
Secretary.

2, *White Lion Court, Cornhill, London, E.C.,*
2nd November, 1893.

CIRCULAR NO. 909.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, White Lion Court, Cornhill, E.C.,
24th September, 1894.

FITTING OF CARGO BATTENS.

GENTLEMEN,—The Committee's attention having been drawn to the fact that there is a variation in the practice of different ports with regard to the fitting of cargo battens between decks, I have to point out that the Rule requires cargo battens to be fitted in 'tween decks of all types of vessels, and in bridge houses, poops, and other deck erections intended for the carrying of cargo; and you are to take steps, where necessary, to ensure uniform compliance with this Rule.

I am, Gentlemen, your obedient servant,

A. G. DRYHURST,
Secretary.

CIRCULAR No. 912.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, White Lion Court, Cornhill, E.C.,
22nd October, 1894.

BOILER MANHOLES AND FITTINGS.

SIR,

The Committee's attention has been drawn to some accidents which have recently occurred to boilers of classed vessels in consequence of the bad fitting of manhole doors and of drain plugs, some of which have been attended with fatal results. I am directed, therefore, to remind you that in surveying boilers, new or otherwise, your examination should include not only the boilers, but also all the mountings and their fastenings, and the manhole doors and their fastenings, special attention being given to the fit of the spigots of the doors in the manholes. These should be so well fitted and of such a depth as to render it absolutely impossible for the jointing material to be forced out between the spigot and the boiler plate, even when the door is so placed that the clearance is all on one side.

I am, Sir, your obedient servant,
A. G. DRYHURST,
Secretary.

NOTICE No. 920.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

REDUCTION OF FEES.

NOTICE IS HEREBY GIVEN that the General Committee, at a Special Meeting held this day, have determined that, on and after 1st January, 1895 and until otherwise ordered, an abatement of 10 per cent. shall be allowed from all fees chargeable after that date for surveys held in the United Kingdom on old ships and old engines and boilers.

By order of the Committee,
A. G. DRYHURST,
Secretary.

2, *White Lion Court, Cornhill, London, E.C.,*
20*th December*, 1894.

NOTICE No. 965.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

NOTICE IS HEREBY GIVEN THAT THE FOLLOWING ADDITION HAS BEEN MADE BY THE GENERAL COMMITTEE IN THE RULES OF THE SOCIETY FOR IRON AND STEEL VESSELS.*

The following addition has been made to *Section* 2 *of the Rules*, for estimating the scantling numbers for Turret deck vessels, viz. :—

TURRET DECK VESSELS.

Depth.—The depth is to be taken from the upper part of the keel to the top of a normal beam line drawn through the point where a vertical line at the quarter breadth of the vessel cuts the upper surface of the vessel's deck ; or, the upper surface continued, where the Turret is nearly one-half the breadth of the vessel, and its transverse section is of rounded form at the base. (*See sketch* A.)

Scantling Numbers.—In vessels of the Turret deck type, *having no sheer*, the first number for scantlings may be reduced by one-half of the standard mean sheer, as set forth in the Freeboard Tables, for a length equal to twelve times the moulded depth of the vessel, measured from top of keel to top of normal beam line at base of Turret, provided that the breadth of the Turret is not greater than one-half the moulded breadth of the vessel, and the radii of the gunwale and base of Turret curves be from 20 to 25 per cent. and 15 to 20 per cent. respectively of the moulded depth.

For vessels of under 24 feet in depth, the measurements are to be taken to the normal beam line as described, but for vessels 24 feet in depth and above, the measurements are to be taken to a point 7 feet below the normal beam line at base of Turret. (*See sketch* B.)

The second number for scantlings is to be obtained by multiplying the first number by the length of the vessel.

In vessels of this type having strongly constructed continuous superstructures, the material of the sheerstrakes, stringer plates and deck plating, as arranged in a vessel of ordinary form should be distributed over the plating of the upper part of the vessel, and the sides of the superstructure, provided that the thickness of the rounded deck plating is not less than $\frac{1}{20}$ of an inch below that of the side plating and that the turret sheerstrake is not less than $\frac{1}{20}$ of an inch below that of the main sheerstrake, as given in Table S 2. Where a second deck is dispensed with, compensating strength must be afforded either by increasing the depth of the web frames, and extending them to the upper part of the rounded gunwale, where web frames are fitted in lieu of hold beams, or by other means.

If in such vessels of under 24 feet depth the length exceeds eleven times the depth, additional strength will be required, as shown in Table S 6, but in vessels of 24 feet depth and above the proportions are to be taken from the depth measured to a point 7 feet below the normal beam line at base of Turret, and they may be 13 and under 14 depths in length, before they are required to have the remaining extra strength at upper part prescribed for vessels of 11 to 12 depths in length, and above these proportions in the same ratio ; but in no case will the material at the upper part, and the number and thickness of steel or iron decks, be required to be greater than that of a three deck vessel of the same dimensions.

For sketches A *and* B *see pages 122 to 124.*

By order of the Committee,

A. G. DRYHURST,
Secretary.

2, WHITE LION COURT, CORNHILL, LONDON, E.C.,
8th October, 1896.

* This addition is now embodied in the Rules for 1897–98

NOTICE No. 983.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

NOTICE IS HEREBY GIVEN THAT THE FOLLOWING ALTERATIONS AND AMENDMENTS HAVE BEEN MADE BY THE GENERAL COMMITTEE IN THE RULES OF THE SOCIETY FOR STEEL VESSELS, AND IN THE RULES FOR MACHINERY FOR STEAM VESSELS.

Section 39.—EQUIPMENT.

(Equipment of Vessels of the Turret Deck Type.)

New paragraph 9 on page 85, as follows :—

The equipment of vessels of the Turret deck type is to be determined by the number produced by the sum of the measurements of the half breadth, half girth of midship section, and depth to normal beam line at base of Turret, multiplied by the length, and this number increased by one-sixteenth.

Rules for the Machinery of Steam Vessels.

STEEL BOILERS.

Paragraph 19 on page 96, amended as shown in italics.

19. *When steel is used* in the construction of boilers intended for vessels classed or proposed for classification in the Society's Register Book, *the boilers shall* be constructed in accordance with the requirements of the Rules, and the following conditions be fulfilled.

1. The material *of longitudinal stays and of plates intended for the cylindrical shells of boilers* is to have an ultimate tensile strength of not less than *27* and not more than *32* tons per square inch of section*. *That of screw stays and of all other plates is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section. In all cases the elongation is to be not less than* 20 per cent. in a length of eight inches. *Test pieces cut from the plates or bars are* to be capable of being bent to a curve of which the inner radius is not greater than one and half times the thickness of the plates or bars, *both when in the normal condition and* after having been heated uniformly to a low cherry-red and quenched in water of 82° Fahrenheit.
2. Steel rivets are to be *of soft and ductile quality having a tensile strength of not less than 26 and not more than 30 tons per square inch and are to be* capable of withstanding the same tests as the plates are required to undergo.

* If the shell plates are to be flanged or welded the ultimate strength is not to exceed 30 tons per square inch.

3. *A temper test is to be made from every plate intended to be used in the construction of boilers, and samples for tensile and cold bend tests are to be selected from each batch of plates, etc., submitted for approval, at least one of each test being taken from each cast or furnace charge from which the material has been produced. When plates are $1\frac{1}{4}$ inches thick, or above, a tensile and a cold bend test are to be made from each plate.*

4 The Society's Surveyor will attend at the steel works when necessary, and select the samples for testing before the plates are sheared to size, and these samples when marked by him for testing should, as far as practicable, be followed by the Surveyor through the different stages of preparation until the tests are completed.

5. The Society's Surveyor will require to have every facility placed in his way for tracing all plates to their respective charges and to be furnished with two copies of the advice notes of the material, one of which, when he shall have been satisfied with the results of the test applied to the material, is to be signed and forwarded to the boiler manufacturer, and the other is to be retained by himself.

6. The samples are taken for testing in order that the general quality of the material may be ascertained, and if any sample should fail to fulfil the conditions laid down, the plate from which the sample is taken must be rejected; and further tests should be made before any material, made from the same cast or charge as the failing sample, can be approved.

7. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.

8. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.

9. No steel stays are to be welded.

10. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

The present NOTICE No. 438*, **BOILERS MADE OF STEEL**, on page 107, omitted.

SHAFTS.

New paragraph 32 on page 97, as follows :—

The length of the stern bush is to be at least four diameters of the screw shaft, and it is recommended that the after liner of the shaft should overlap the bush at the forward end, by about half the diameter of the shaft, being tapered in thickness at the part not bearing on the bush. It is also recommended that the shaft should be lapped or protected at the ends of the liners, or should be covered with a brass liner extending the whole length of the stern tube, the liner joints, if any, being lapped and burned.

Additions to paragraph 41 on page 106 :—

The diameter of the screw shaft should be at least $\frac{21}{20}$ths of that required for the crank shaft. The part forward of the stern gland may be tapered in size to that of the adjoining intermediate shaft.

The thrust shaft under the collars should be of the same diameter as the crank shaft. It may be tapered off at each end to the same size as the intermediate shafts.

CYLINDRICAL SHELLS OF STEEL BOILERS (page 100).

The Co-efficients **C** of formula altered and the addition made, as shown in italics.

The strength of cylindrical shells of steel boilers is to be calculated from the following formula :—

$$\frac{C \times (T - 2) \times B}{D} = \text{working pressure in lbs. per square inch.}$$

where **D** = mean diameter of shell in inches.

T = thickness of plate in sixteenths of an inch.

B = the least percentage of strength of longitudinal joint found as follows :—

C = *21* when the longitudinal seams are fitted with double butt straps of equal width.

C = *20·25* when they are fitted with double butt straps of unequal width, only covering on one side the reduced section of plate at the outer lines of rivets.

C = *19·5* when the longitudinal seams are lap joints.

If the minimum tensile strength of shell plates is 28 or 29 tons per square inch instead of 27 tons per square inch these values of **C** *may be correspondingly increased.*

STAYS.

Third paragraph on page 101, under heading Stays, amended as follows :—

Steel Stays.—For **screw** stays not exceeding $1\frac{1}{2}$ inches smallest diameter, 8,000 lbs. per square inch; for **screw** stays above $1\frac{1}{2}$ inches smallest diameter, 9,000 lbs. per square inch. For other stays not exceeding $1\frac{1}{2}$ inches smallest diameter, 9,000 lbs. per square inch, and for stays exceeding $1\frac{1}{2}$ inches smallest diameter, 10,000 lbs. per square inch. No steel stays are to be welded.

FLAT PLATES.

Fourth paragraph on page 101, under heading Flat Plates, altered as follows :—

P^2 = square of pitch in inches. If the pitch in the rows is not equal to that between the rows, then the mean of the squares of the two pitches is to be taken.

CIRCULAR FURNACES.

The Rules for Plain Circular Furnaces on pages 103 and 104 amended as follows :—

The strength of plain furnaces to resist collapsing to be calculated as follows :—

Where the length of the plain cylindrical part of the furnace exceeds 120 times the thickness of the plate, the working pressure is to be calculated by the following formula :—

$$\frac{1{,}075{,}200 \times T^2}{L \times D} = \text{working pressure in lbs. per square inch;}$$

Where the length of the plain cylindrical part of the furnace is less than 120 times the thickness of the plate, the working pressure is to be calculated by the following formula :—

$$\frac{50 \times (300\,T - L)}{D} = \text{working pressure in lbs. per square inch,}$$

where **D** = outside diameter of furnace in inches,

T = thickness of plate in inches,

L = length of plain cylindrical part in inches, measured from the centres of the rivets connecting the furnaces to the flanges of the end and tube plates, or from the commencement of the curvature of the flanges of the furnace where it is flanged or fitted with Adamson rings.

Note.—The foregoing alterations and amendments also apply to the Rules for the Machinery for Iron, Wood, and Composite Vessels, and Steam Yachts.

By order of the Committee,

A. G. DRYHURST, *Secretary.*

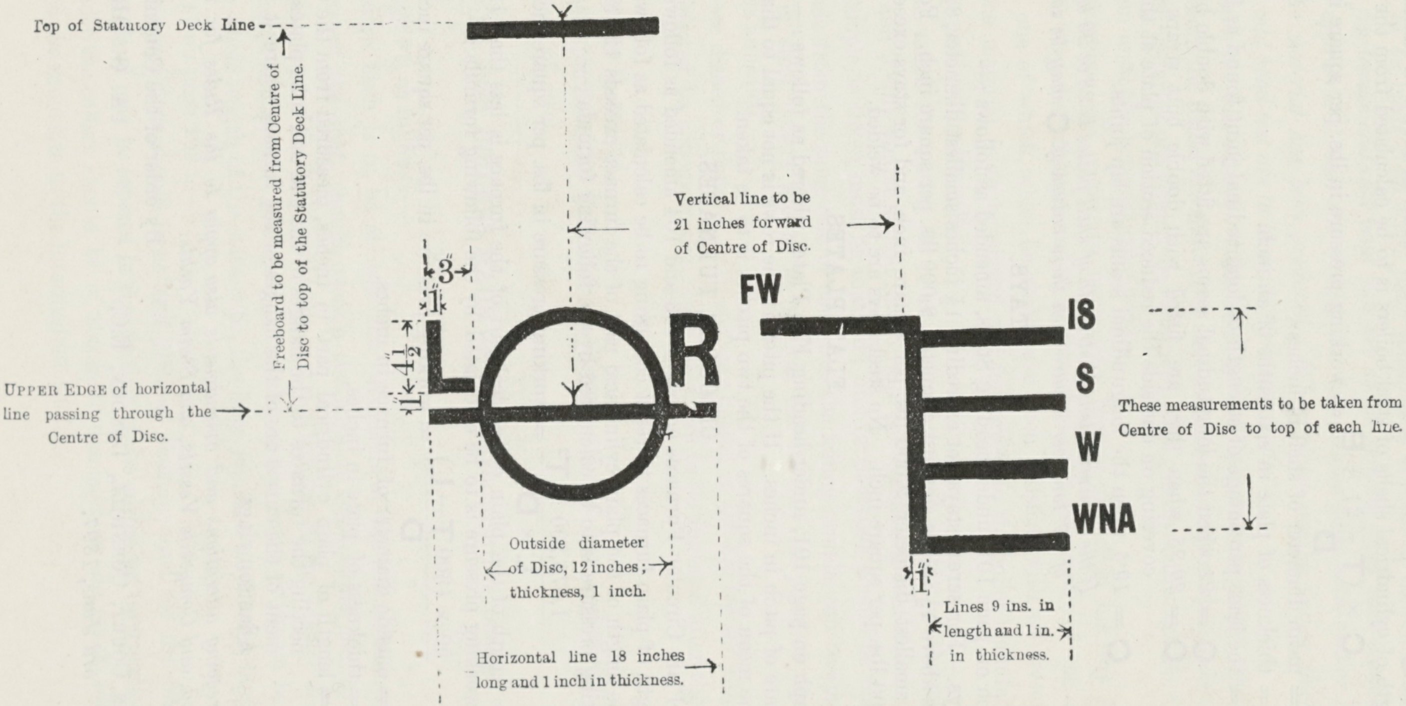
2, WHITE LION COURT, CORNHILL, LONDON, E.C.
3rd June, 1897.

ASSIGNMENT OF FREEBOARD

Under the Merchant Shipping (Load-Line) Act, 1894, the Committee of Lloyd's Register are empowered to assign freeboards to British Vessels as required by the Act. Forms of application for the assignment of freeboard can be obtained from the London, or other, offices of the Society.

The mode of Marking, approved by the Board of Trade, is as follows :—

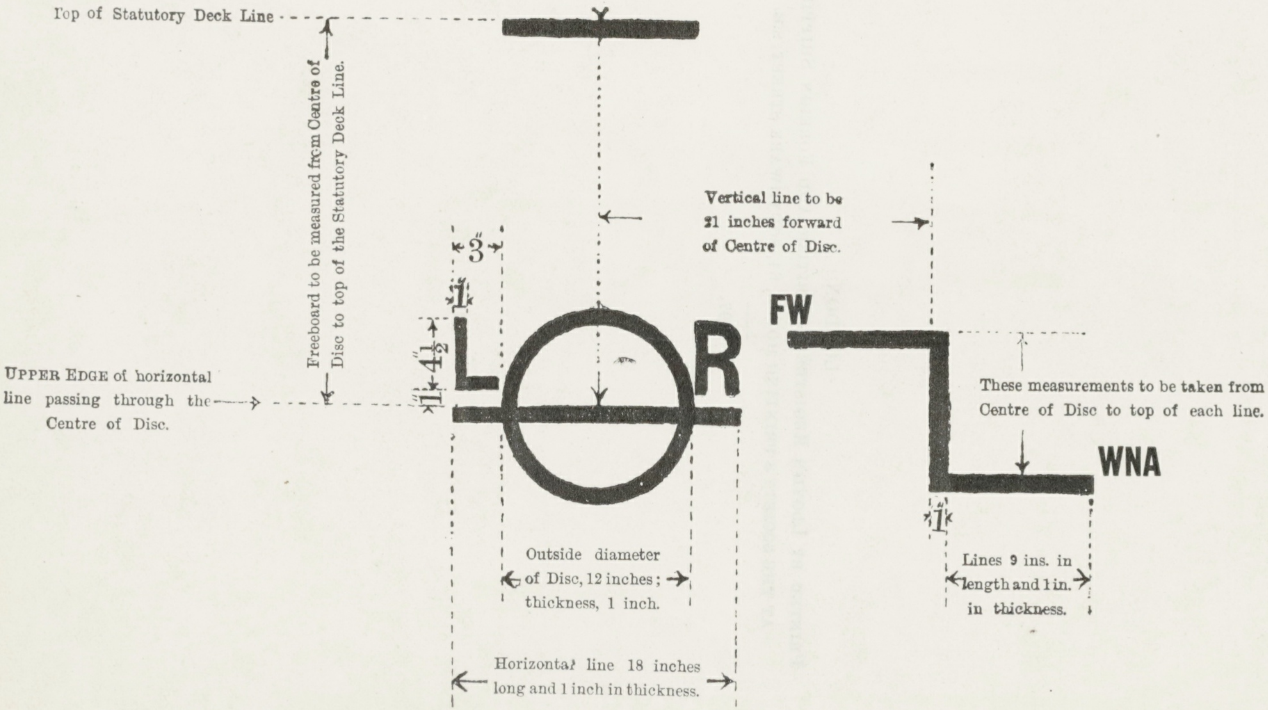
FREEBOARD MARKING FOR STEAMERS.



The Centre of Disc to be placed on both sides of vessel amidships, *i.e.*, at the middle of the length of the load water line. Vessels are to be marked with such of the horizontal lines as are applicable to the nature of their employment. In accordance with the regulations made by the Board of Trade, the discs and lines must be permanently marked by centre punch marks or cutting, and the particulars given in the Certificate are to be entered in the official log.

N.B.—It is a condition on which an awning or partial awning-decked vessel is classed in the Society's Register Book that the Freeboard assigned shall be marked on the vessel's sides as above prescribed ; and, under the provisions of Section 43 of the Society's Rules for Iron or Steel Ships. If the vessel proceed to sea with a less freeboard than that approved by the Committee, or if the freeboard mark be placed higher than the position assigned by the Committee, the vessel will be liable to have her class expunged from the Register Book.

FREEBOARD MARKING FOR SAILING VESSELS.



The Centre of Disc to be placed on both sides of vessel amidships, *i.e.*, at the middle of the length of the load line. Coasting vessels are required to be markedwith only the maximum load line in fresh water. In accordance with the regulations made by the Board of Trade, the disc and lines must be permanently marked by centre punch marks or cutting, and the particulars given in the Certificate are to be entered in the official log.

LONDON:
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1897.

1897-98